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EDITED BY
G. S. SAUNDERS, F.L.S., F.E.S.

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A JAPANESE GARDEN IN ENGLAND.

By JAMES HUDSON, V.M.H.

[Lecture given on April 25, 1905.]

It was at the suggestion of Mr. Leopold de Rothschild that the Japanese garden was arranged at Gunnersbury, the great interest that he takes in every phase of gardening being well known to all the horticultural community. The idea originated from some photographs taken at one of the beautiful gardens upon the Bellaggio side of the Lake of Como, where there is a similar garden. These photographs were taken by Mr. Lionel de Rothschild, who also is a keen patron of gardening. From these photographs I worked out the Gunnersbury Japanese garden, following the lines as nearly as possible, rather than those laid down by some authorities on Japanese gardens.

JAPANESE GARDENS, OR GARDENS COMPOSED CHIEFLY OF JAPANESE PLANTS.

The primary consideration in the formation of any garden should be the suitability of the site for the specific purpose in view. If greater attention were paid to this, the instances of failure or of unsatisfactory progress would be far less frequent. Having chosen the site, then adapt it in the best possible way for the object intended.

It is now well known that exposure to the keen biting winds of both winter and spring is oftentimes more conducive to failure than frost itself. To this essential point due regard must be paid in the case of many plants indigenous to Japan; such, for instance, as bamboos and palms; even the maples and some of the coniferae require shelter from cold winds such as we experience in most parts of England. Shelter must therefore be provided, if not already existing in a sufficient degree. In our case we had scarcely any provision to make in this respect, being well screened by evergreens, walls, and tall trees.

The suitability of the soil is most important. In this, too, we have had to deal with a good but rather heavy loam; hence, by adding farm-yard and stable manure, with peat where needed, the ground was brought into condition without any removal of soil. Nor was it necessary for us to add many drains to carry off any excess of water; the surrounding trees operated in this instance to assist us. Personally, I attach great importance to the preparation of the soil by deep trenching, so that the plants will have everything in their favour from this source. We did the work of preparation in the winter of 1900-1, but could do very little planting until late in the spring; thus we had time to get the ground into fairly good condition. All of it was broken up at least three feet deep, and manure worked into every "spit." The stones for paths were laid before much planting was done. No regular plan was adopted, the most formal part of any being a bamboo avenue (fig. 1), which was a distinct feature in the garden at Bellaggio; all other parts are of informal and irregular formation. We could not have our pools any lower because of the depth of the entrance to the main overflow drain, hence the ground is not so undulating as it would otherwise have been. The water is supplied through bamboo poles with wrought-iron pipes put inside of them so as to guard against leakage.

Those who conduct gardening operations within a certain radius of any large city or manufacturing centre know full well what has to be contended with as regards the smoke-begrimed atmosphere and its attendant fogs, heavily laden with sulphurous gases. This too has to be considered; hence in our case to attempt to cultivate any large quantity of the coniferæ that form such remarkable objects in the landscape of Japan would only be to court failure. In a degree this has been unfortunate, as it prevented us from keeping so closely to what is considered to be one of the chief characteristics of gardening art in Japan, viz. the pigmy or dwarfed shrubs and trees, now so well known in England. Not that all Japanese gardens are designed on these lines, for I have been favoured with the sight of many photographs which did away somewhat with this idea as to what constitutes a Japanese garden. This was especially noticeable in the photographs brought home by the Hon. Miss Roche (now the Countess Hochberg), and likewise in the paintings executed in Japan by Miss Ella Du Cane, which were exhibited in London last year. In the former instance the photographs exemplified the adaptation of the natural growth of the plants chosen to the surroundings. I noted in these photographs also that shade-loving plants were provided for more than one would be led to suppose. This is, I think, as it should be. In another set of landscape views taken by a gentleman whose name I cannot recall, it may be noted that both phases of Japanese landscape design are illustrated. In some of these the free woody growth and its attendant shade are clearly manifest, and a most welcome retreat thereby provided during the hot weather.

The chief season, or that which one sees most frequently depicted in designs upon china or in paintings, is the spring. This is a subject matter which has to be considered in the formation of a Japanese garden in this country. The question must be asked, "In what season of the year is the garden in question expected to be at its best?" In our case



FIG. 1.—BAMBOO AVENUE IN GUNNERSBURY PARK.

it is the late summer and autumn, August, September, and October. It is obvious, therefore, that spring-flowering plants would not be suitable in such a garden; hence we had to dispense with them to a very great extent, much to my regret. We have had rather to depend upon the semi-tropical vegetation that is presumably more characteristic of Southern Japan; therefore some plants that are not hardy in England have been used. Some of these are not strictly indigenous to Japan, but are found in the Chinese Empire and the East generally. A few of the pine family have been planted; but, knowing the drawbacks to their healthy growth near London, caution has been exercised both in the number and varieties planted. Bamboos thrive very well indeed, being always in a presentable condition, but are, like *Chamaerops excelsa*, at their best in the autumn. The last named, in fact, is fresh and green all the winter through, no artificial protection whatever being afforded to the plants; this palm should be more often planted in English gardens than it is, but if possible let it be near to and slightly above the water level. Considering the hardihood of *Chamaerops excelsa*, it is surprising that it has been so much neglected; given shelter from the north, north-east and east, it will thrive exceedingly well, and under such conditions it will not require any protection in winter. Both bamboos and hardy palms are, with us, proof against the "fog fiend." Other plants of evergreen character, *Aralia* (*Fatsia*) *Sieboldi* and *A. S. variegata* answer our purpose admirably, especially the latter, which is infinitely superior in leaf development and general appearance to the type. We find that the so-called Sacred Tree of Japan, *Illicium religiosum*, another evergreen, thrives remarkably well; its sweetly perfumed greenish-yellow flowers are freely produced. We use *Aucuba japonica* around the outskirts as a shelter plant: it makes high, dense bushes, which we find most useful in this respect. The best of the pines are *Pinus koraiensis*, *P. parviflora*, and *Abies polita*. The umbrella pine, *Sciadopitys verticillata*, we find thrives very well when its essential needs are supplied—a peaty soil and abundant moisture. *Euonymus japonicus elegantissimus* and *Euonymus radicans variegatus* are both useful as dwarf plants, the latter being pegged down between the stepping-stones. We use a few of the dwarf coniferæ, such as the forms of *Retinospora*, *R. plumosa aurea*, and *R. leptoclada*; the latter has really a pigmy manner of growth when it is grown naturally. Another subject that does well with us is *Podocarpus macrophylla*, which is only of moderate growth, hence all the more useful. *Osmanthus ilicifolius* is a most useful shrub also; it is, in fact, at home in almost any position, in the shade or exposed to the sun, and either in a dry or a wet situation. I consider it to be one of the best plants ever introduced from Japan by the late John Gould Veitch. I regret we are unable to grow andromedas, which would, if for the sake of the foliage only, be an acquisition. Amongst the dwarf evergreens we group tall-growing Japanese chrysanthemums in October arranged in distinct colours; for this purpose 'Soleil d'Octobre' is one of the best; 'President Hardy' is also a good colour—a deep chestnut.

Deciduous Subjects.—Amongst deciduous plants the maple family are perhaps the most effective as autumnal decorative subjects by reason of the varied tints of bronzy red, golden-yellow, and crimson which they



FIG. 2.—ONE OF THE WALKS IN THE JAPANESE GARDEN, GUNNERSBURY PARK.

then assume, whilst at the same time they do not grow too vigorously. *Dimorphanthus mandschuricus* (otherwise *Aralia spinosa*) is a plant of striking and bold appearance when a strong growth is aimed at by pruning, as occasion may arise, but when it is allowed to flower (though even then it is an acquisition) the foliage is less effective. The variegated form known as *D. mandschuricus variegatus* is a lovely and most effective plant when grown in the shade, the silvery variegation being then brought out to perfection; but the golden form of this plant is at present rather scarce, and requires to be grown in the full sun to bring out its best features. The gigantic foliage of *Gunnera manicata* is strikingly effective amongst bamboos and other light-growing plants. The eulalias, as *E. zebrina* and *E. japonica variegata*, serve a good purpose, being quite easily kept within limits. *Paulownia imperialis* succeeds fairly well, but it needs rather more exposure and warmth to be at its best. The deciduous magnolias are only used sparingly, and the same remark applies to the cherries and to the pæonies for reasons already given. *Anemone japonica* in variety is more useful, so also is *Cimicifuga japonica* (syn. *simplex*). The funkias, in great variety, are extremely useful for undergrowth, besides which they flower well. So also is *Rodgersia podophylla*, lovely both in the spring and autumn, also *Saxifraga peltata*, both of these needing moisture.

Of hydrangeas we have planted *H. hortensis* (the type), *H. h. Mariesii*, *H. h. mandschurica*, *H. quercifolia*, and *H. paniculata grandiflora*. Of these the last has been the most satisfactory thus far, but I do not yet despair of success with the others. We are not, of course, far enough south or near enough to the sea-coast to suit these plants well without lifting, and re-planting them every spring after the frosts are safely over. It is the late frosts that do the most injury to the terminal buds of the *H. hortensis* section, without which we cannot hope for flower. Lilies we have planted freely, a few only of the earlier flowering varieties such as *L. Hansoni*,* but considerably more of *L. speciosum* (syn. *L. lancifolium*) in its best forms—these need to be in sunny positions as far as possible;—*L. tigrinum*, chiefly *Fortunei*, and also *L. longifolium*, the Cape or retarded bulbs being chosen; those, however, of the latter that have once flowered in pots will, when afterwards planted out, do well for one season. Perhaps the finest of all the lilies for our purpose is *L. Henryi*,† which has, in a peaty soil, become quite naturalised and flowers from year to year, as also does *L. Hansoni*, but the others need renewing after the second year. *L. Henryi* has, I think, a good future before it in our English gardens, given a sheltered place where the spring frosts do not injure its young shoots, which are liable to be caught from the beginning of April onwards. *Lilium auratum* and *L. a. platyphyllum*, of course, are planted freely and they prove most effective, so also is *L. a. rubro-vittatum*. Montbretias flower rather too early, but in their place *Antholyza crocosmacoides* is an excellent substitute; this we find quite hardy, and it flowers freely. Of aquatic plants we have tried *Nelumbium luteum*, but it was not a success,

* Not a Japanese variety.

† An Eastern lily, but not Japanese.



FIG. 3.—ONE OF THE POOLS IN THE JAPANESE GARDEN, GUNNERSBURY PARK.

although it survived the first winter. *Sagittaria japonica* fl. pl. is, on the other hand, quite hardy and flowers freely. *Zizania aquatica* (the Canadian rice) grows to a large size from seed sown in the spring, reaching 7 feet in height. This we use in preference to the rice of Japan and the East—*Oryza sativa*—because of its better constitution. We have one pool for a blue *Nymphaea*, *N. pulcherrima*, which has succeeded fairly well, the water being partially warmed by the overflow of water from the lily tanks in another locality. Of floating plants *Myriophyllum proserpinaecoides* is a most lovely plant when in free growth; it is also known by the name of the ‘Parrot’s Feather.’ *Eichornia crassipes floribunda* grows freely, but fails to flower in proportion for want of more sun. *Pontederia cordata* succeeds very much better, being closely related to it. Other *Nymphaeas* are used to a moderate extent to give effect. A most satisfactory plant is *Mimulus luteus*, which floats upon the water and flowers very freely. A few forget-me-nots, *Myosotis palustris*, fill up round the margin in partially shaded places, anything being preferable to a bare edging.

Fences and Gates.—We adopted both gates and fences made of bamboo rods, having noticed that these are almost always used in Japanese designs. The fences were made of the black-stemmed *Phyllostachys nigra*, and are about 4 feet 6 inches high. In order that the fence might not be too conspicuous it was worked in amongst the surrounding shrubs to some extent. The gates, as entrances, were fixed at convenient spots, all being made upon the premises by our own men. Both in fixing and in making, all that we used was wire and split cane to cover the same afterwards. By means of the fences and gates we are enabled to a great extent to keep out both rabbits and cats.

Stepping-stones and Walks.—In arranging the walks we have followed the Japanese as well as we could, using stones only. These were obtained from the neighbourhood of Tunbridge Wells, being very well suited for the purpose, not having a tendency to become slippery because of their somewhat uneven surface. In size they varied considerably, some being 4 feet or more in length and 2 feet 6 inches in width; others are smaller, and others even smaller still, but in no instance is any regular shape to be found. They are laid simply as hewn from the quarries, and are on an average some 4 inches in thickness. These stones are not in any way laid in a regular line or manner, nor are they bedded upon a solid base, being simply laid upon the soil. Thus arranged it is an easy matter to move a stone or two to the right or left if any plant wants more room or when a fresh arrangement is aimed at altogether. The stones are not laid to touch each other, a space of from 4 to 6 and sometimes 8 inches being allowed between them. These interstices are filled in with plants of varied character, *Euonymus radicans variegatus* and the mossy saxifrages being very suitable. *Arenaria balearica* and similar plants also answer well, and so does the common musk (*Mimulus moschatus*). In some cases at the sides of the stones we have used *Acorus gramineus variegatus* to good purpose, in others the funkias are near to the stones, whilst ferns also are to the fore. A very prominent plant in Japanese gardens is *Rhodea japonica* and its variegated form, which varies as much as *Aspidistra lurida variegata*. This latter is

also a Japanese plant, but not hardy with us ; we use it, however, in the summer.

Summer-house.—Last year we erected a summer-house somewhat after the Japanese style. It is rectangular in shape and built of bamboo only with the one exception of the roof, which is thatched with leaves of *Cocos Yatai* (syn. *C. Bonnetti* *), which came over from Japan as packing material. The sides were formed of erect rods of *Phyllostachys nigra* of varied heights, graduated so as to form semicircles with an opening on one side only. Thus far no seats have been arranged for. I should add that all the fixing is done by wire, covered afterwards with cane, the main pieces being pegged to give greater stability. Situated amidst bamboos and acers it produces a good effect.

Japanese Lanterns.—There are two Japanese lanterns of different design, both being wrought out of granite of the heaviest and hardest description ; both these came from Japan, being there known under Japanese names to distinguish the style. We have not had occasion to place lights in these lanterns, but I can imagine the effect being somewhat weird. Their appearance, however, adds certainly to the general effect. In fixing them it is safer to have a solid base to keep them from getting out of the perpendicular ; otherwise, if tall, they might topple over. In every design of a Japanese garden these lanterns appear, almost without an exception, and frequently at the base or near thereto is seen a plant or more of *Rhodea japonica*, which appears to be as indispensable as the lantern itself.

A Bamboo Bridge.—Having an opportunity, we introduced a bridge to span part of the water. This is made of a framework of bamboo strengthened with T-iron through the two large canes that bear the weight. This also is tied with stout wire, afterwards being covered with large or rather broad lengths of cane. It adds to the effect from a distance. I alluded to the water supply which also is an adaptation of the method in use by the Japanese. It answers its purpose well and may fairly be termed a Japanese pump. By having a steady inlet of water at all times, both in winter and summer, the water in the pools is kept much fresher than it would otherwise be and is rarely ever frozen.

The planting of our Japanese garden, *i.e.* as regards the hardy or permanent plants, was done in the spring of 1901. The bamboos and palms were planted by May 10, these about completing the planting. By almost constant attention to watering during the hot weather of the early summer of that year a very rapid growth was made, and by the autumn the garden was well furnished. No protection has been given to the plants, and so far we have lost very few.

Of tender plants of Japanese origin some are used, as *Rhapis flabelliformis*, *Cocos Yatai*, and *Phoenix tenuis* (the last named being an intruder). *Chamaerops humilis* stands exposure well, but it cannot be deemed quite hardy. For a screen some tall plants of *Dracaena* (*Cordylina*) *australis* are employed to hide a high wall. With these rather tender plants some variations in arrangement are possible from year to year.

* Known also as *Cocos australis*.

PLANTS CULTIVATED IN GUNNERSBURY JAPANESE GARDEN

Acer (Japanese varieties).	Lilium Henryi.
Acorus gramineus variegatus.	" longiflorum.
Arundinaria anceps.	" " giganteum.
" Hindsii graminea.	" speciosum album.
" japonica.	" " Kretzeri.
" nitida.	" " Melpomene.
" Simoni.	" " rubrum.
Bambusa fastuosa.	" tigrinum.
" palmata.	Magnolia conspicua.
" tessellata.	" " Alexandriana.
Caesalpinia sepiaria.	" grandiflora.
Chrysanthemums.	" purpurea Lenné.
Cimicifuga japonica.	Mischanthus japonica foliis striatis.
Citrus trifoliata.	" " zebrina.
Cornus elegantissima.	" sinensis.
Dimorphanthus mandschuricus	Paeonia Moutan.
variegatus.	Paulownia imperialis.
Enkianthus japonicus.	Phyllostachys aurea.
Fatsia japonica.	" castillonis.
" " variegata.	" flexuosa.
Funkia Fortunei caerulea.	" henonis.
" grandiflora.	" nigra.
" ovata alba marginata.	" Quilicoides.
" Sieboldiana.	" ruscifolia.
" " alba marginata.	" sulphurea.
" " variegata.	" virescens.
" undulata variegata.	" viridi-glaucescens.
Ginkgo biloba.	Picea polita.
Hemerocallis aurantiaca.	Pinus Cembra.
Hydrangea hortensis.	" koraiensis.
" " japonica.	Podocarpus macrophylla.
" " mandschurica.	Pollinia gracillima.
" " Thos. Hogg.	Polygonum cuspidatum.
" " variegata.	Prunus pseudo-cerasus.
" paniculata grandiflora.	Quercus dentata.
" quercifolia.	Rhodea japonica.
Illicium religiosum.	Rhus vernicifera.
Iris Kaempferi.	Rodgersia podophylla.
Juglans Sieboldiana.	Sciadopitys verticillata.
Larix Kaempferi.	Sophora japonica pendula.
" leptolepis.	Styrax japonica.
Lilium auratum.	" obassia.
" " macranthum.	Tamarisk sinensis.
" " rubro-vittatum.	Trachycarpus excelsus.
" Hansoni.	Wistaria sinensis.

THE FORMATION AND CARE OF LAWNS AND GOLF-GREENS.

By MARTIN H. F. SUTTON.

[Lecture given on January 23, 1906.]

ANYONE who has travelled on the Continent must have been struck with the systematic care which is lavished upon the production and up-keep of the green sward. Lawn is a name hardly applicable to the turf which the French, German, and Italian gardener has to create under conditions so adverse compared with those obtaining in this country. On the Riviera such green swards have often to be re-made year by year by the fresh sowing of grass seeds, as the sun sometimes actually destroys the plants during the scorching summer.

It would be very interesting to give the experience that I have had in providing a suitable prescription of grasses for these ephemeral grass-plots. But our business is with English lawns and putting-greens, and there are many divisions into which these two great subjects naturally fall.

Though all grass swards in gardens are lawns, yet the varieties of lawns are much greater in England than elsewhere. While the foreigner is content with a patch of grass as a setting to his flower-beds, the lawn in England is expected to bear the wear and tear of constant use; and the uses to which lawns are put are so different, and the wear and tear they undergo vary so greatly in degree, that it is necessary to make a new lawn or to deal with an old one according to the uses to which it will in future be put.

Doubtless many persons still think the best way to form a lawn is by laying turf which has been cut from adjoining fields, where it may look fine in texture, and all that could be wished for. This question I shall touch upon briefly; but in view of the fact that all the best practical gardeners have now come to the conclusion that the only way to obtain a lawn absolutely free from plantain and other weeds is to sow a grass-seed mixture, I shall confine the greater portion of my remarks under this head to the formation of lawns by seed rather than by turf.

In order to keep strictly within the limits prescribed by the title that has been suggested to me, I propose, in as few words as possible, to divide this paper into two main sections, *i.e.* :—

1. The formation, care, and after-treatment of lawns for general purposes; and
2. The creation and subsequent treatment of putting-greens.

THE FORMATION OF LAWNS.

Situation and Aspect.—When the formation of a lawn is contemplated, the first point for consideration is, of course, where it shall be. Unfortunately, in ninety-nine cases out of a hundred, the choice of

position is very limited—if, indeed, it is open at all—as conditions other than suitability determine the matter. When, however, a choice is possible, preference should certainly be given to that with a northern aspect, especially in the Midlands and South of England, where the sun in a scorching summer often proves excessively trying to the finer grasses. Where local circumstances render a plentiful supply of water impossible, the question of aspect is a far more important matter than is generally realised.

Drainage.—One of the primary conditions necessary to the obtaining of a perfect lawn is the presence of sufficient moisture to supply the needs of the various grasses of which it is composed. As in other spheres of life, however, excess is as detrimental as starvation, and consequently the question of drainage next requires our attention.

In the preparation of land, drainage, where necessary, takes precedence of all other work; but it is of such paramount importance that the work should be carried out thoroughly and efficiently, that the employment of a practical man, perfectly acquainted with the duties of laying the pipes and capable of studying the special requirements of each particular case, is a necessity.

Satisfactory drainage of land intended for a lawn is a far more intricate matter than those unacquainted with the subject would suppose; and such questions as the rainfall of the district, the character of the soil, and the aspect of the land need to be judiciously considered, as upon such points will depend the size of the pipes to be used, the depth at which they should be laid, and the distance between the rows.

The roots of most grasses do not penetrate far into the soil, and consequently deep drainage is not a necessity, and a very usual distance is fifteen feet between the rows and a depth of three feet from the surface. On some classes of soil, of course, artificial drainage is fortunately unnecessary, and, as a general guide, natural drainage may be assumed to be efficient and satisfactory where heavy rain is found to pass freely away. It is important, however, to remember that when drainage is completed, and the trenches are filled in, they invariably sink, and require fresh soil in order to renew the true level. Consequently, drainage should be effected some months before it is intended to commence sowing operations.

The most suitable situation having been decided upon, the next consideration is the character of the soil, and it is desirable to consider this point with reference to the purpose for which the lawn is required. For general purposes nothing better can be desired than a somewhat deep rich loam, sufficiently porous to allow of satisfactory drainage. Unfortunately, however, it is seldom that one finds such a soil available, and therefore it may often be necessary to introduce fresh surface-soil from elsewhere.

In the preparation of cricket grounds the soil of which happens to be of a crumbling nature and of a very porous character, it has often proved of great advantage to cover such part of the surface as may be requisite for the wickets with a few cartloads of clay to the depth of an inch or an inch and a half. Where clay has been put on in this way in the autumn, and has been broken up during the winter by the action of frost and rain,

it has been found to roll down into a splendid surface in the spring, and to stand constant hard wear in a way which the original soil would have been quite incapable of doing.

This plan might be followed with advantage in the preparation of many lawns of a light and crumbling character, especially when intended as tennis courts. The comparative slight depth of the clay is not sufficient to prevent drainage, while the surface is improved at least 50 per cent.

On land of a very light or sandy nature little success can be hoped for without a coating of soil of a more retentive character. Such operations may be dreaded on account of their cost, but in view of the fact that a lawn once put down is expected to stand for many years, it is really false economy to avoid such expenditure as may be necessary in order to obtain a satisfactory surface.

It should also be remembered that no amount of manure can compensate for an unsatisfactory soil, as in the case of very light soils all soluble manures will be washed through immediately, and at the end of a couple of years the land will be just as bad as it was before the application.

A word of warning is, however, necessary as to imported soil, inasmuch as, however good it may look in quality, it is almost certain to contain seeds of many objectionable weeds, and unless steps are taken to destroy them, when the grass seed is sown they will grow up with the grass and may eventually kill the finer grasses. It is not too much to say that 90 per cent. of the complaints which the seedsman receives about alleged impurities in the lawn seed supplied is not traceable to the seed, but to the weeds that have been introduced in imported soil; indeed, to anyone who understands the subject at all, it is obvious that many of the weeds complained of come from seeds which, from their size and shape, could not possibly be included in the mixture of lawn seeds by any seedsman possessing the slightest knowledge of his business.

The only perfect remedy is to burn all imported soil, and in the case of heavy or clay soil the burning has such beneficial results that it is a practice worth adopting quite apart from the seeds of weeds. It must, however, be remembered that the process of burning removes most of the fertilising properties of the soil, and these must be returned in the form of manure, as care should always be taken that the land to be used for forming lawns is in thoroughly "good heart."

The expense of maintaining lawns would not be nearly so heavy if the preparatory work were carried out efficiently. The top spit of the soil, or at least the upper six inches, should consist of a good loam into which a heavy dressing of well-rotted farmyard manure has been incorporated, and any expense and trouble will be fully repaid, whilst the beneficial effects will be noticeable for years. Thirty cartloads, or even more, per acre will not be too much, or where farmyard manure is not easily obtainable an application of superphosphate of lime, Peruvian guano, and bone dust, at the rate of two cwt., one cwt., and four cwt. respectively, will generally prove beneficial when evenly spread and well worked into the soil. It is, perhaps, hardly necessary to urge how extremely important it is to get land into thoroughly good condition before any seed is sown.

In the vegetable garden a particular vegetable is hardly ever grown two years consecutively on the same soil, and even if it were there is no difficulty in manuring the land each season. In the case of lawns, however, when once a lawn is laid down it is intended to remain for many years; it is impossible to apply fresh applications of manure in the ordinary way, and the only way of nourishing it is by the process known as top dressing, which, though effective, is at best only an indirect means of getting at the roots. In very few cases would the application of farm-yard manure to a lawn as a top dressing be tolerated, on account of its unsightliness, and consequently lawns are entirely dependent on artificial manures when once they are sown down.

In connection with the preparation of land for lawns, the usual practice is to commence operations in autumn and to allow it to lie fallow throughout the winter. This undoubtedly means unsightliness for the time being, but it will result in that beautiful tilth from the action of frost which is a *sine qua non* for successful sowing. That the ground should be level is so obvious that it is hardly necessary to state it, but a friable condition of soil is essential, and no good lawn can be obtained without it. Constant raking and rolling after such winter fallow will do wonders.

TURFING VERSUS SOWING.

For the benefit of those who may be interested in the subject, I propose to introduce here a few remarks as to the comparative merits of the formation of lawns by turf and by seed.

Probably the chief advantage that turf possesses over seed is that a lawn is at once covered with grass instead of remaining bare for a considerable period. In addition to this, however, it is often supposed—and the assumption is sometimes correct—that a lawn composed of turf can be more quickly brought into a condition fit for use than a lawn sown with seed.

Each practice has its merits, but it is now generally admitted that the advantages of turfing are far outweighed by the very serious disadvantages which are apparent the moment turfing is contemplated. There is, first of all, the difficulty of finding really good turf, and turf which may look excellent in a meadow consequent upon close grazing and treading by sheep, may prove to be utterly unsuitable after being put down to form a lawn under totally different conditions. It should be remembered that natural turf is composed of grasses which are suitable to the particular soil upon which it is growing; consequently, if turf is removed to another locality only those grasses will flourish which, like the stronger varieties, can adapt themselves to their new surroundings.

Another point to which particular attention should be given is that in these days, when the preparation of special prescriptions of grasses to meet particular needs has been brought to a science, the adoption of turf is to this extent an antiquated policy, in that it makes an intelligent combination of grasses out of the question.

The cost, however, of turfing will always remain one of the chief difficulties, unless, indeed, one is so fortunate as to have in one's own possession good turf close at hand. It has been estimated that the average cost of laying out an acre of land with turf usually runs into

close upon £100. This of course includes labour involved in cutting, carting, and relaying, in addition to the actual prime cost. In view of the fact that a mixture of the very finest grasses obtainable, of guaranteed purity and germination, and amply sufficient in quantity to sow an acre, can be obtained for £6 or £8, it will be seen that turfing is a practice not to be resorted to without the strongest possible reasons.

It is certain that a lawn prepared in the way it should be, and sown down with the finest seeds, will, if properly tended, produce an infinitely finer turf than can ever be obtained by the process of turfing; while, with reference to the formation of a lawn by this means, it is perhaps sufficient to say that from a sowing of pure seed of high germinating power I have known lawns fit to play on in from eight to ten weeks from the date of sowing. I need hardly say, however, that such results are only obtainable in exceptional circumstances.

Apart from all these considerations, there may be isolated cases where turfing can with advantage be resorted to, and it may be advisable, therefore, to point out that the turves should be laid in the autumn. If laid in the spring there is always the possibility of a period of warm weather in April or the beginning of May, when the sections will invariably separate under the influence of a hot sun, and despite the filling in of cracks with soil and the sowing of seed the lawn may be perfectly useless during the whole of the summer.

THE CHOICE OF SEEDS TO SOW.

With the choice of seeds to sow we come to that part of my subject which undoubtedly contains more features of interest than any other.

Notwithstanding the great advance which has been made during the last few years, even now only the most acute observers realise the immense importance attaching to the selection and relative proportion of grasses in the formation of a lawn. Just as the undue preponderance of a drug, useful in itself if kept within correct proportions, in a doctor's prescription may have the most serious results, so in a mixture of grasses the value of a prescription may be entirely destroyed by the inclusion of an excess of one particular variety.

It must also be remembered that grasses vary considerably in vigour and to some extent in habit according to their surroundings, and with the object of getting the best results the peculiar conditions of each particular case must be carefully considered. A knowledge, therefore, of the native or indigenous herbage of the district is often essential to success.

I cannot now enter upon an elaborate and technical explanation of the structure of a grass, but perhaps I may briefly refer to one or two points to demonstrate the desirability of, at any rate, a limited acquaintance with a few of these distinctive characters.

There is no great difficulty in recognising a grass when it is in flower in the hedgerow or in a meadow; but in the case of turf no such guide is available, and consequently a certain amount of botanical knowledge and experience is necessary, with a view of determining the species of which it is composed.

To the amateur the work necessary to the obtaining of such knowledge may be a deterrent; but the identification of grasses by their roots and leaves is a fascinating study, and will well repay the labour involved. And the moment the subject is taken up it is astonishing to find what a number of minute variations there are, all of which assist the student to determine the different species, and some of which indicate to the close observer the cause of certain varieties preferring one soil more than another. To give one instance only of this, I may point out that the more developed the fibres of a root are the greater is its capacity for withstanding drought.

The roots of some grasses are stoloniferous or creeping, others are bulbous, the bulb being the thickened base of the shoot, while in others again the roots are thick and cordlike in texture. A great deal may also be learnt from the colouration of the base of the shoots, which vary from yellow and dark brown to red and red veins on a white sheath.

Few people are aware of the remarkable differences in the leaves of grasses, and of the wonderful beauty in the tracing of the veins; yet grass leaves differ in shape, size, colour, thickness, and hairiness, all of which features are of great service in the identification of species.

The plan of creating a lawn by the sowing of one kind of grass only is never now adopted by a practical gardener. However suitable a particular variety may be for the soil for which it is intended, it can never give satisfaction alone, because there is no one grass in perfection all the year round, and plants of the same grass generally remain isolated and refuse to grow together.

To the amateur the knowledge of the varieties of grasses specially suitable for the formation of lawns is of the greatest importance; a most interesting article could be written on this subject alone.

Perennial rye grass is probably still employed more largely than any other grass. With the demand, however, for turf far finer in quality than was ever thought of a few years ago, the use of perennial rye grass has diminished. In addition to perennial rye grass, a few of the more important species are:—*Poa pratensis* (Smooth-stalked Meadow Grass), *Festuca rubra* (Red Fescue), *Festuca duriuscula* (Hard Fescue), *Cynosurus cristatus* (Crested Dogstail), *Festuca ovina* (True Sheep's Fescue), *Festuca ovina tenuifolia* (Fine-leaved Sheep's Fescue), *Poa trivialis* (Rough-stalked Meadow Grass), *Poa nemoralis* (Wood Meadow Grass), and *Achillea Millefolium* (Yarrow or Milfoil).

Poa pratensis: it may be said that it withstands drought and keeps a beautiful colour throughout the summer.

Festuca rubra is another variety which, on certain soils, proves quite invaluable. Unlike *Poa pratensis*, however, it turns very brown in dry weather when on a light soil. Perhaps it should be added that great care should be taken in the purchasing of this seed, as, though entirely distinct, Hard Fescue is constantly sold under the name of *Festuca rubra*.

Festuca duriuscula, or Hard Fescue, is probably better known to the amateur than any other of the finer grasses. Nothing wears better, and a proportion of this species may be safely included in every mixture.

Cynosurus cristatus, or Crested Dogstail, is a variety which will always

keep its place in lawn grass mixtures, and it is specially useful in combination with Perennial Rye Grass.

Festuca ovina.—True *Festuca ovina*, like True Red Fescue, is not always easy to obtain, but a proportion of seed of this species is a valuable adjunct to every mixture, and it is of great assistance in making a turf of really fine quality.

Festuca ovina tenuifolia (Fine-leaved Sheep's Fescue) is quite unlike other varieties, and the foliage is far the finest in texture of any grass in general use. Its beautiful dark green colour makes it very attractive.

Poa trivialis (Rough-stalked Meadow Grass) is a grass which, unlike such varieties as Hard Fescue, has distinctive uses. In foliage it much resembles *Poa pratensis*, but revels in damp and heavy soils, and consequently should always be included in mixtures intended for such conditions.

Poa nemoralis (Wood Meadow Grass) is always useful in a lawn of fine texture, and has the merit of being almost the only grass which will grow under trees.

Poa annua.—A year or two ago constant reference was made in the horticultural papers to *Poa annua* (Annual Meadow Grass), which, as all present probably know, is the little weed pest of our gravel paths.

It is an interesting species from many points of view, and no grass comes to maturity so quickly: indeed, it has been known to spring up flower, and ripen seed in from four to five weeks, and it is the fact that new plants are constantly springing up that has probably led people to erroneously assume that it is perennial in character. It will never, however, in my opinion, be of any value for the purpose of a lawn, for it altogether refuses to amalgamate with other and more suitable varieties.

Achillea Millefolium (Yarrow or Milfoil).—This plant stands quite by itself, in that it is neither a grass nor a clover. It greatly assists in providing that elasticity which is so pleasant a feature in all good turf; but inasmuch as it is very liable to become coarse it must be constantly mown.

Clovers in Lawns.—I cannot leave the question of the particular plants of value in the composition of a lawn mixture without referring very briefly to the desirability, or otherwise, of including clovers. There is probably no question relative to lawns upon which there is so much difference of opinion. Some people insist upon their inclusion in every mixture, while others have a pronounced antipathy to them. Speaking generally, however, there is no doubt that they should be avoided on tennis courts, where it is all-important that the ball should rise quickly and truly from the surface. On the other hand, in lawns for general purposes, clover is advantageous the first year after sowing, in that it quickly covers the ground, and will make the use of the lawn possible earlier than if grasses alone had been sown. Here again, however, the constant and careful use of the mowing-machine is essential, or the plant may become strong and unsightly.

The three usual species of clovers used for the purpose are: (1) *Trifolium repens* (White Clover), a species which is indigenous all over the country; (2) *Trifolium minus* (Suckling Clover), the diminutive foliage of which makes it very useful where clovers are desirable. Strictly speaking, this

variety is an annual, but, owing to its habit of freely seeding, even when closely mown, it perpetuates itself from year to year; and (3) *Medicago lupulina* (Yellow Trefoil), which much resembles Suckling Clover, but the foliage of which is paler in colour, while the plant is generally covered with a fine down.

The proportions in which these various grasses and clovers should be used very largely depend on local conditions, and I have often seen an identical mixture of seeds sent at the same time of year to two different places, with the same object in view, produce widely different results, from no fault whatever of those who have had to do the practical work, but solely on account of the variation in the character of the two soils and climatic conditions.

Quantity of Seed to Sow.—Whether clovers are included in the mixture or no, it is unnecessary for me to emphasise the importance of sowing new and pure seeds of strong germinating power; but a generous seeding is always advisable in order to smother the annual weeds, and it should be remembered that the fine grasses of which a lawn is composed do not tiller out to the same extent as the larger pasture varieties. At least four bushels to the acre should be sown, and this quantity may be considerably increased with every advantage to the lawn, for the closer the plants are crowded together the finer will be the quality of the herbage.

Sowing.—The time at which to sow in order to obtain the best results has always been a debatable point; some preferring the spring and others the autumn. Generally speaking, however, sowing may take place any time between the middle of March and the end of September, provided, of course, favourable weather is experienced. When spring sowing is resorted to it is wise to complete the operation before the commencement of May, in view of the probability of a dry period setting in; while autumn sowing cannot be generally recommended after the end of September or middle of October, owing to the danger of early frosts. Personally, however, I am in favour of autumn sowing, as the damp mild weather usually experienced in October is ideal for the germination of grass seeds, and there is far better chance of getting a thoroughly good lawn and fit for use the following summer than when sowing is delayed until the spring.

However perfect a mixture may be, no success can be expected unless the seed is sown by someone conversant with the operation. Two sowings at right angles to each other are always preferable to one, and naturally a quiet day is essential, as grass seeds are very light and cannot be distributed evenly in a wind. After sowing, the soil should be carefully raked, but this operation must be done very lightly, as grass seeds will not germinate unless close to the surface, and afterwards a double rolling at right angles will be necessary. The first three essentials to the seeds after sowing has taken place are air, moisture, and light, each of which plays its beneficent part in assisting germination.

As soon, however, as the grass is above ground, it requires most careful treatment. The quality of the future turf will largely depend on whether the processes of cutting and rolling are commenced soon enough, and carried out systematically and intelligently afterwards. When young, the grass must never be mown by a machine, but should be topped with

a scythe, and this should be done frequently until the plants tiller out and become sufficiently strong to bear the mowing-machine. Even then, however, great care should be taken to see that the machine is in perfect order, and that the knives are set correctly and so sharp as not to pull up the young plants. Meanwhile, the roller also must be in constant use, otherwise firm turf cannot be obtained.

SPECIAL POINTS RELATIVE TO CROQUET LAWNS, TENNIS LAWNS, AND BOWLING GREENS.

By persons unacquainted with the subject it would hardly be supposed that different treatment was necessary in the preparation of the ground and in the constituents of the turf for croquet lawns, tennis lawns, and bowling greens, yet there are special points requiring attention in each case, and this is especially so with regard to bowling greens.

Croquet has now become such a science that a lawn must be as true as a billiard table; while in the case of a tennis lawn greater toughness of turf is necessary owing to the severe wear which it experiences. The formation of a bowling green, however, demands more skill than any other kind of lawn. The turf must be very fine in texture, absolutely level, and so perfect and elastic in character that the bowls may run out every fraction of energy imparted to them by the player.

The most elaborate system of drainage is necessary in order that no superfluous moisture may remain on the surface, and the drain-pipes are usually covered with a six-inch layer of furnace ashes and cinders to ensure the ground being thoroughly porous. This rubble should be watered, beaten, and rolled until a perfect level is obtained, and upon this foundation a bed of stones should be laid, and in its turn covered with a layer of sand one inch in thickness. On the top of this from two to three inches of rich clean soil are required, upon which the seed should be sown.

THE IMPROVEMENT AND "UP-KEEP" OF LAWNS.

Before turning for a few moments to the points of special interest relative to putting-greens, I propose to make a few remarks upon the improvement and "up-keep" of lawns.

In view of the fact that the formation of a really good lawn entails so much labour, consideration, and expense, it is most disheartening to find that it has distinctly deteriorated in quality after it has been down four or five years, and, as nothing occurs without a cause, it will be well to consider a few of the points which should receive attention from time to time.

Undoubtedly, by far the most important factor in connection with such deterioration is the impoverishment which results as a lawn advances in years, consequent upon the exhaustion of the soil from no return having been made for the crops of grass removed by the machine.

I have already referred to the serious way in which lawns are handicapped with regard to the application of manure; but in the case of lawns which have been down for some years it is astonishing how few

people ever think of manuring at all, and yet grass needs manure just as much as any other plant, and, in view of the fact that grasses grow all the year, except in the depth of winter, they perhaps on this account require more sustenance than other plants which grow for a shorter season only. It is certainly an entire mistake to suppose that grass can sustain its verdure and strong growth without any stimulant whatever. The same fatal mistake was made for many years in laying down land to pasture. When land was not required for anything else it was sown to grass and left to look after itself, and to many and many a farmer it never occurred that grass required feeding like other crops.

Generally speaking, the principal constituents of plant food required by grasses which are often found in deficient quantities in an old lawn, are nitrogen, phosphoric acid, potash, and lime. All such manures, however, must be applied with discrimination and after careful consideration of local conditions, as certain classes of soil will naturally become more deficient in one constituent than in another. If too strong a nitrogenous manure is applied, the grass will grow so quickly as to cause the turf to become hollow. An excess of ammonia will encourage coarseness of leaf in the plants, but if applied in moderation it undoubtedly improves the colour of the herbage. A dressing of bone meal, superphosphate, and basic slag will supply the turf with phosphoric acid, while kainit provides potash.

Sometimes old lawns become thin and poor. Any such tendency should be at once checked, otherwise restoration may take some time and necessitate considerable outlay. Raking or harrowing will often prove beneficial, but this will seldom be sufficient unless accompanied by a good top-dressing of artificials. In addition, suitable renovating seeds should be sown at the rate of a bushel per acre, or more, and, as in the case of the original sowing, it can take place with equal advantage either in spring or autumn.

Mossy Turf.—One of the most frequent causes of annoyance in old turf is moss, which makes its appearance freely under certain conditions, and is almost invariably due to indifferent drainage and consequent sourness of soil. When moss becomes really troublesome, the drainage is probably defective; and it is a serious question whether, despite the cost and the outlay entailed, it may not be true economy to have the drains up and entirely relay them. If this is out of the question, however, the quality of the turf may be greatly improved by severely tearing the surface with an iron-tooth rake to detach the moss. Such moss should be collected and destroyed by burning.

A compost of fine soil, slaked lime, and well-rotted manure sifted through a half-inch-mesh sieve and applied as a dressing to a depth not exceeding half an inch, and followed by an application of bone meal at the rate of four ounces to the square yard, will prove most beneficial. This should be raked carefully over and well rolled down.

Weeds.—As all those who own a lawn know to their cost, it is astonishing in how short a time a lawn will be disfigured by the appearance of various kinds of weeds, such as dandelion, plantain, thistle, and daisy. Some of the seeds of these weeds are introduced by birds, others are blown by the wind. Various suggestions have been made for

their extermination, but unfortunately there is no really satisfactory way of getting rid of them except by manual labour. They are, however, far more easily dealt with in a young state than after they have been allowed to mature. Undoubtedly a certain amount of good can be done by dipping a wooden skewer into sulphuric acid, strong carbolic acid, or one of the liquid weed-destroyers, and plunging it into the centre of the plant. There is always, however, the danger of killing grass as well, in addition to which such preparations need very careful use, or serious consequences may follow to the operator.

There is one other cause of annoyance in lawns with which owners do not always know how to deal. Sometimes hollows appear, through the sinking of the turf. In the case of newly-made lawns, the turf is generally not of sufficient maturity to cut up and roll. In this case the hollows should be filled with a thick covering of soil to the same level as the surrounding turf, and then sown with the same mixture of grass seeds as was used originally. Depressions in old lawns can be more easily remedied. In this case it is only necessary to cut and roll the turf occupying such hollows, and fill up the bed underneath with fresh soil to the proper level. The turf can then be replaced, pressed down, and watered. Naturally this operation should take place at a time of year when the turves have every chance of growing together again.

THE CREATION AND SUBSEQUENT TREATMENT OF PUTTING-GREENS.

The very name of golf possesses a fascination for its devotees which is probably unique, and the extraordinary development of this game throughout the length and breadth of the country during the past twenty years certainly has no parallel in any other form of sport. It has been computed that in England alone there are no fewer than half a million golfers, and, this being so, it is evident that the creation of putting-greens and their subsequent treatment are matters of very considerable importance.

Golf courses exist not only in every county but on soils varying in as great if not to a greater degree than lawns themselves, and, however unsuitable the soil, the greens must conform to the very high standard required by the present-day golfer, or the course will be condemned and ultimately prove a failure. The very fact of there being such divergent conditions on different courses makes it all the more important that the correct treatment should be adopted from the first, and in the absence of a ground-man of very considerable experience it will be well to secure expert advice.

Situation.—It is unnecessary to point out that a golf course should always be situated in the open, where it can obtain the full benefits to be derived from the action of the sun and rain; and where any choice is possible as to the direction in which it should face, the question of altitude, soil, and immediate surroundings should be duly considered.

Soil.—If soil of good texture and rich in humus is desirable for lawns, it is of even greater importance for putting-greens. Severe though the treatment may be to which a lawn is subjected, it always has the winter months in which to recuperate, whereas golf-greens are in constant use

the whole year round. But, however good a green may be, there is a limit to its powers of endurance, and consequently if it is to continue in a healthy condition it must have a periodical rest. To meet this difficulty, when it is found practicable to do so, no better course can be adopted than the formation of duplicate greens. If this is impossible, however, each green should be made of greater dimensions than are actually required for the exigencies of play, so that the hole may be constantly moved and the wear to which the turf is subjected evenly distributed.

According to the prevailing taste of the day the golfer's paradise consists in a course on the sea coast where sand dunes predominate. It will be readily conceived that the formation of putting-greens under such circumstances is no easy matter. No amount of rolling will make such soil cohesive, for it is always dry and crumbling in character, and the rain goes through it as it would through a sieve. In such cases undoubtedly the best plan to adopt is to apply a good dressing of clay or marl before the greens are formed. In the same way, where the conditions are the reverse, an application of sand to a heavy clay soil will effect a permanent improvement in the turf.

Turfing versus Sowing.—The question of turfing *versus* sowing has already been dealt with at some length in the former part of this Paper, and there is nothing for me to add thereto, unless it is to say that perhaps sowing has even more advantages over turfing in the case of putting-greens than it has in the case of lawns. As I have already stated, natural turf varies greatly according to soil, climate, and locality. Probably no natural turf in Great Britain approaches in quality the famous Silloth turf, which is almost entirely composed of perennial grasses, for the growth of which the conditions prevailing at Silloth are ideal. If is, however, an indisputable fact that such turf, when placed in different surroundings, does in course of time deteriorate, and even the employment of turf possessing such a reputation as Silloth turf undoubtedly has can hardly therefore be considered worth the great outlay involved, in view of the fact that a beautiful turf may be formed in a comparatively short time with a mixture of the finest grass seeds, so proportioned as to entirely suit any particular locality. On up-to-date putting-greens such a perfect surface is demanded that the number of grasses suitable for the purpose is strictly limited, and within such limitation the success of the green entirely depends upon the proportion in which they are used. I have seen many a green absolutely spoilt by the inclusion of too great a preponderance of one species.

Amongst grasses particularly useful for this purpose are:—*Poa pratensis*, *Festuca rubra* (true), *Festuca ovina* (true), *Festuca ovina tenuifolia*, *Festuca duriuscula*, and *Agrostis vulgaris*. All these grasses have their distinctive uses on different soils; they are compact growing, not too exacting in their requirements, and capable of producing perfect putting-greens when given proper attention. Other grasses which are useful in certain cases are:—*Poa trivialis*, *Cynosurus cristatus*, and dwarf Perennial Rye Grass. The remarks which I have already made relative to the latter species when dealing with lawns are even more important in connection with putting-greens, and much thought should be given to the many important considerations involved.

Necessity of Careful Treatment.—Even when, however, a mixture of grasses is so perfectly proportioned as to leave no possible room for improvement, no really good putting-green can be looked for unless the care and attention bestowed upon it after the seed has been sown is equally thorough and judicious.

There is an old story of an American admiring the beautiful lawns at Magdalen College, Oxford, who, on asking the gardener, who was mowing, the secret of the success there attained, with the intention of obtaining similar lawns in the United States, received the laconic answer, “We mows ’em and rolls ’em and rolls ’em and mows ’em for thousands and thousands of years!” While there was certainly a trace of exaggeration in the gardener’s statement, his answer undoubtedly embodies the secret of true success. Constant rolling and mowing applied with the judgment born of experience are essential if good putting-greens are desired, and when once established the closer and oftener the grass is cut the more firm and compact will the turf become. On putting-greens mowing may with advantage be carried on the whole year round, except, of course, during a hard frost.

One of the best examples known to me of thoroughly up-to-date care of putting-greens is at Sunningdale, where mowing is so constant and the treatment is so perfect that certain grasses which, on account of their coarse characteristics when allowed to develop, cannot usually be recommended in a putting-green mixture, are employed there with the best possible results.

Clovers, of course, are not generally suitable for putting-greens, and should never be used except in cases where a really first-rate green is hardly to be hoped for, and where it is impossible to get the finer grasses to grow thickly enough alone to form a satisfactory turf.

Artificial manuring is just as important in connection with putting-greens as with lawns, and, as the manurial treatment I have advocated in an earlier part of this Paper applies equally to greens, I will not repeat it, except to add that on heavy soils, where the rain does not pass away as freely as it should, a top-dressing of sharp sand is often advantageous. It helps to keep the green clean and sweet, and prevents the tendency to sourness which the necessary sweeping and rolling sometimes cause during the winter months. Greens sometimes lose that beautiful freshness of colour which is so great an attraction, and which gives the English putting-greens such an advantage over those to be found on the many courses which are now springing up for the benefit of English visitors all over the Continent. Applications of soot or charcoal will prove very beneficial both as a remedy and as a preventive against want of colour, but they should be applied in wet weather and well watered in.

Nursery.—I have already advocated the policy of creating duplicate greens so that each green may undergo a due period of rest. Sometimes it happens, however, that a green becomes worn very badly in one particular spot, though the rest of the surface may be in good order.

In view of the fact that this difficulty is always liable to arise, the formation of a nursery composed of turf made of exactly the same mixture of grasses which has been used for the creation of the putting-green will be found very advantageous. It must be remembered, however, that such

turf cannot be taken up, rolled, and used for patching the green unless it is itself two or three years old, so that the wisest course is to sow a nursery down at the same time as the putting-green itself.

Worms.—It now only remains for me to deal with the question of worms. The subject is one around which there has always been much discussion. No doubt exists as to the valuable part they play in letting air and light into the soil, and if Darwin's statement that "on meadow land the wormcasts amount annually to eighteen tons, and on good arable land to about ten tons per acre," be really true, probably few of us fully realise the benefits they confer upon the soil. Great as these benefits are, however, in the case of putting-greens, new and old, wormcasts are a very great nuisance; indeed, their presence makes correct "putting" out of the question, and consequently the eradication of the worm is now generally considered an absolute necessity. It should be remembered, however, that soil from which worms have been taken will require more manuring rather than less in order to, in some degree, counteract the absence of their beneficial work.

Many preparations have been advocated for eradicating worms from the soil. The majority of such preparations are of a poisonous and somewhat dangerous character, and need handling with care. The subject has long been one of very great interest to myself, and during the past summer I have been carrying out a series of experiments at Reading, as a result of which my firm are now placing on the market in limited quantities a preparation which is entirely distinct in its constituents from any other, which is perfectly harmless to human life, and which we have never known to fail in a single instance. This preparation not only effectually removes worms for a very considerable time, but has valuable manurial constituents which to a very large extent counteract any evil effects resulting from the removal of the worms.

GARDEN NOMENCLATURE.

By G. W. BULMAN, M.A., B.Sc.

[Lecture given on March 6, 1906.]

GARDENING has many aspects, all of them interesting. Usually, however, it is regarded from two points of view only, viz. as a means of profit, or as a recreation. The garden as a study has been somewhat neglected. And yet, as it is one of the most delightful places for study, so also it may be one of the most profitable and fruitful in results.

Gardening, for example, offers unique opportunities for the study of natural history. Every gardener should be a naturalist, and every naturalist should have a garden as a part of his laboratory for practical work.

A garden, again, offers the best materials for a study of the problem of variation in plants and the modifications which can be produced by careful selection.

When the French writer Alphonse Karr bid farewell to his friend who was about to travel, he said, "You are going to make a tour round the world; I am going to make a journey round my garden." The result of this journey was a fascinating book which well illustrates the use of the garden as a study.

Again, we may make our garden an interesting study in geography. Our bed of dahlias, for example, carries us in imagination to the sandy plains of Mexico, where Humboldt first discovered them; geraniums and heaths carry our thoughts to the Cape, where they form so dominant a feature in the vegetation; jasmine and camellia suggest the Land of the Pigtail and the Islands of the Rising Sun. But the special aspect of garden study to which I wish to direct attention this afternoon is that of plant names. It is a wide subject which seems to grow as you work at it. I have also found it a very interesting one, and I hope to be able to communicate a little, at any rate, of that interest to you.

The names used by the gardener seem sometimes to have been chosen in a spirit of perverseness. The so-called Syringa, the sweet-scented mock-orange blossom, is no relation to the real Syringa, being the *Philadelphus* of botanists. The true Syringa is the lilac belonging to a very different order, that of the Olives. The species commonly grown are *Syringa vulgaris* and *Syringa persica*.

And neither of the laurels usually grown in gardens can claim to be the real laurel. They are, in fact, both species of cherry, and belong to the order *Rosaceæ*. The one, the cherry laurel, is *Cerasus laurocerasus*; and the other, the Portugal laurel, is *Cerasus lusitanica*. The true laurel, *Laurus nobilis*, is the bay tree, the type of an order—the Laurel order—which contains also the camphor tree and the cinnamon tree.

The familiar and much grown Nasturtium, or Indian cress, a member of the Geranium family, has borrowed the name of the watercress, which

is the true *Nasturtium*, and of the order *Cruciferae*. The "crocus purple hour" of spring is repeated in autumn, when the leafless blossoms of the autumn crocus burst through the soil. But the autumn crocus is not a crocus at all, but a *Colchicum*, from certain species of which the famous gout medicine is prepared. It has been said—but I will not vouch for the truth of it—that the mole is familiar with this gout remedy, and that when a too assiduous attendance at its subterranean Diet of Worms brings on painful symptoms it runs a tunnel to the nearest bed of *Colchicum*.

Perhaps the most curiously named of garden plants is the Jerusalem artichoke, which is not an artichoke, nor did it come from Jerusalem. For this familiar vegetable is botanically *Helianthus tuberosus*, the tuberous-rooted sunflower. The real artichoke, the globe artichoke, is a sort of thistle, the plant of which Alfred de Musset wrote in his "Fantasia," "Thistles leave the ass's jaws to be flooded with sauce in the Bishop's silver dish . . . the thistle may become an artichoke." When the Jerusalem artichoke flowers, as it has occasionally done in this country, it proves its title to be called a sunflower. It is said to come from North America, where it was cultivated by the Indians before the settlement of the country by Europeans. The French settlers called the tuber *pommes de Canada*. In Italy the plant is known as *Girasole Articcocco*, that is, sunflower artichoke, and the Jerusalem of the English name is said to be a corruption of *Girasole*. A writer in the "Quarterly Review," however, attributes this solution to a clever guesser, and declares that the Italians did not call it *Girasole*. The word "Jerusalem," he points out, presents no difficulty, for many plants have been so called which did not come from Jerusalem. The name was given as a mark of honour, or as an indication of the exotic character of the plant. Nor is the Japanese artichoke an artichoke from the botanical point of view, though it is rightly named Japanese. It is a species of woundwort with tuberous roots, *Stachys tuberosus*, and is called an artichoke from the similarity in flavour.

The plane tree, or sycamore, is one of the most curiously named of plants. For the true plane tree, or *Platanus*, belongs to the great catkin-bearing family, while the sycamore belongs to the Maple group. Botanists note this by calling it *Acer pseudo-platanus*. The only excuse for calling it the plane is the somewhat similar broad leaves. Nor has it any better right to the name sycamore, which means mulberry fig, and is the proper name of the *Ficus Sycamorus*, the sycamore tree of Scripture.

Botanists, again, have had to reproach the so-called *Acacia* of our gardens with the same word "pseudo," and name it *Robinia pseudo-acacia*. Its flowers, however, being irregular and papilionaceous, resembling those of the Laburnum, are very different from those of the true *Acacia*, which are regular, and resembling those of the *Mimosa* or sensitive plant. *Robinia* is also sometimes grown under the name of the locust tree, to which it has no more right than to that of *Acacia*. The real locust tree, or St. John's bread, is the carob tree, *Ceratonia Siliqua*.

The winter aconite of the gardener, the earliest flower of the year, is not the aconite. Monkshood, with its tall spikes of blue flowers, is the real aconite, and source of the well-known poison. Its more familiar name monkshood, or friar's cap, may serve to remind us that in olden times the monks were the physicians and gardeners of their age. In their

gardens they grew both medicinal and pot herbs, and relics of their gardening still linger. Thus almost the only place in Northumberland where the deadly nightshade is found is on the cliffs below the old priory of Tynemouth—probably an “escape” from the monks’ garden. Other “escapes” growing on the same cliffs are wild cabbage, Alexanders—formerly used as a pot herb—and blue *Salvia*, or clary, the seeds of which were used for eye complaints. And one of the very few places where I have seen the deadly nightshade growing wild was among the ruins of Furness Abbey.

The so-called major convolvulus, again, is an *Ipomœa*.

The scarlet and other coloured geraniums of the gardener have no right to the name which properly belongs to the wild crane’s bills of our woods and meadows. Although belonging to the same order the gardener’s “Geraniums” were separated by L’Héritier, in 1787, under the title of Pelargoniums. They are distinguished chiefly by two characters. In the true Geraniums the flower is regular, while in the Pelargoniums it is irregular, the two upper petals being larger or smaller and differently marked from the other three. In the Pelargonium, again, the back sepal is furnished with a hollow spur which is adnate with the stem, while this is wanting in the Geraniums. If the flower-stalk be cut through just behind the flower the hollow will be seen in the Pelargonium, while the stalk of the Geranium will be found to be solid.

In some cases a name has been passed on from one flower to another in a curious way. The history of the word “forget-me-not” is one of the most interesting of these. In almost every European language the little flower thus known to us bears an equivalent name. Yet with us it has only borne the title for some forty years. The name “forget-me-not” seems to have been first given to one of the speedwells, or to the speedwells generally. The flower of the speedwell falls very readily, and it falls in one piece, the petals being slightly united at the base. Hence as you gather the blue blossoms they drop, and you greet them with the words, “Speed well, forget-me-not!” And in Denmark the name “Forglemm-mig-icke” appears to have been retained for the speedwell. In Mexico the equivalent, “no me olvide,” is given to an orchid. Presently, however, in this country the name was transferred to another little blue flower, the ground-pine or bugle, for the reason that its strong smell will not allow you to forget it. It is obvious, however, that on this ground there are many plants with much stronger claims to the title. It has been suggested, indeed, by “Punch” that from this point of view the onion has the best claim to the title of “forget-me-not.” Then the title passed on to its present owner, formerly known as mouse-ear scorpion grass, the *Myosotis* of botanists ;

The sweet forget-me-not
That grows for happy lovers

of poets.

It is said that Mills, in his “History of Chivalry,” invented the legend of the drowning knight throwing the flower to his lady, and fixed the name on the pretty blue flower previously known as *mouse-ear* from its old Greek name, *myosotis*.

The potato is another name-usurper. For in the form of Batata, or Patata, it was the specific name of a species of *Convolvulus*. The tuberous roots of this *Convolvulus* were used as the potato is now used. In Shakespeare's "Let the sky rain potatoes" it is supposed to be the tubers of this *Convolvulus* which are referred to. They were brought to Spain from the West Indies, and thence imported here. They were in use as a delicacy before the advent of the present potato, and are now known as "sweet potatoes."

The sunflower, which, according to Moore,

turns on her god when he sets
The same look that she turned when he rose,

is not the original owner of the name. For it appears that the word "sunflower" was used in English literature before this plant was brought over from its native haunts in North America. It is conjectured that the original sunflower was the English marigold, which has the requisite disc-like form and appropriate yellow colour.

And according to its botanical name, *Helianthemum*, the rock-rose is also a sunflower. And the same property attributed by Moore to the sunflower is expressed in the name of that favourite flower the heliotrope, which means sun-turning. The real heliotrope is a member of the Borage family, while the so-called winter heliotrope, the fragrant coltsfoot, is one of the *Compositæ*.

Henbane is the name of the poisonous *Hyoscyamus niger*. It is usually explained as hen-bane, a bane, or poison, to hens, because it was supposed to be specially fatal to fowls and other gallinaceous birds. But we note that Shakespeare calls it "cursed hebenon," which hardly bears out this explanation. And Gower, the friend of Chaucer, writes of "Hebenus, that Sleepy tre." Spenser, again, writes of a "heben bow, spear, and lance." The Hebenus was therefore a tree, and bows were made of it. This suggests the yew, and further investigation confirms the suggestion. For Dr. Nicholson, in 1879, and the Rev. W. A. Harrison, in 1882, showed that the symptoms described as occurring in poisoning by Hebenon were such as are produced by the yew, and by no other poison. It has also been shown that the name of the yew in many northern tongues, especially in that of Denmark, is very similar to Hebenon. Thus it appears that the henbane, *Hyoscyamus niger*, is wearing the slightly altered ancient name of the yew tree.

Many names which should be restricted to one genus are used so as to include species often belonging to widely different orders. Take the word "nettle," for example: the nettle, botanically *Urtica*, belongs to an order which includes hemp and the elm tree. The dead nettle and the hemp nettle, on the other hand, belong to the widely separated Labiate order.

The term "lily" should be restricted to the genus *Lilium*, but it has been extended in popular language to a number of plants usually belonging to different orders; thus the lily of the Nile is of the Arum family; the Lent lily is a *Narcissus*; the water-lily belongs to the *Nymphæaceæ*; the shepherd's lily, one of the conspicuous flowers of the New Zealand Alps, and which perhaps gets its name from the fact that its large saucer-

shaped leaves are often filled with water, and offer a refreshing draught to the shepherd, is a *Ranunculus*.

Nor is the term "violet" restricted, as it ought to be, to the genus *Viola*. Thus the water-violet is one of the *Primulaceæ*, and the dame's violet is one of the *Cruciferae*. And according to the commentators Virgil uses the term *Viola* for the wallflower as well as the violet.*

The word "leek," again, is not confined to the familiar garden vegetable, the national badge of the Welsh, *Allium Porrum* of botanists. For is there not the familiar house-leek, Jove's beard, planted on the house-top to ward off the lightning, which is a near relation of the stonecrop? And the second syllable in "hemlock" was originally leek, which formerly meant any green kitchen herb.

A large number of plants have received the name of honeysuckle, which have no connection with our familiar and fragrant woodbine, and do not belong to the genus *Lonicera* of Linnæus.

Thus the common red clover of our fields has often been called honeysuckle, and French honeysuckle is a leguminous plant, *Hedysarum coronarium*. In America there is a honeysuckle which is botanically an Azalea, while in Australia they apply the word to a species of Banksia. In Jamaica they have a honeysuckle which is a Passion-flower.

One of the dog-woods is also known as dwarf honeysuckle in this country.

The word "plantain," again, is used for plants in three very different and widely separated genera: *Plantago*, the plantains or ribgrasses; *Alisma*, the water-plantains; and *Musa*, which includes the plantains and bananas.

The botanical order of the grasses is a very definite and well-defined one. Yet the word "grass" is used of a large number of plants which have no affinity with it. Goose-grass belongs to the bedstraw genus, *Galium*; knot-grass—the "hindering knot-grass" of Shakespeare—is *Polygonum aviculare*; whitlow-grass and scurvy-grass are both cruciferous; Grass-of-Parnassus belongs to the Saxifrage order; scorpion-grass is a name of the forget-me-nots.†

The yellow loosestrife of the woods is one of the *Primulaceæ*, while the purple loosestrife of the river banks belongs to the *Lythraceæ*. Lavender is a Labiate, while sea-lavender belongs to the same order as the thrift. Milkwort, *Polygala*, gives its name to its order, while Sea-milkwort belongs to the Primrose family.

The word "rose," again, has been extended beyond the genus *Rosa*, to which it ought to be restricted. Thus the primrose, that is, the first or earliest rose, does not even belong to the order *Rosaceæ*. It is a flower of a very different form, and has been made the type of a distinct order, the *Primulaceæ*. The rock-rose, again, belongs to the *Cistus* order.

Nor has the Rhododendron, that is, "tree-rose," any claim to the title, for it belongs to the great Heath family.

Says Biron in Shakespeare's "Love's Labour's Lost,"

At Christmas I no more desire a rose
Than wish a snow in May's new-fangled shows.

* The so-called "violet powder" is made from *Iris florentina*. The dog's-tooth violet is *Erythronium*, and belongs to the Lily tribe.

† Felon's grass is a name given to the hellebore in Westmorland.

Yet we are all glad to welcome the fair white blooms of the Christmas rose in the dark days of December and January. But the Christmas rose is no more a rose than the primrose or the rock-rose. It is one of the hellebores, *Helleborus niger*, a member of the *Ranunculus* order.

And then there is the rose of Jericho. This interesting plant is an annual growing in dry sandy places. As the seeds ripen the leaves wither and curl inwards, with the seeds inside. The plant is loosened from the sand and blown about by the wind over the desert sands. Sooner or later it finds a resting place, and on being moistened uncoils and sheds its seed. The rose of Jericho, however, is not a rose, but one of the *Cruciferae*.

Rose-apples, again, are the edible fruits of species of *Eugenia*, and belong to the Myrtle order. The little celandine, otherwise known as pilewort—the flower of which Wordsworth said :

There is a flower, it shall be mine,
It is the little celandine—

being a *Ranunculus*, is no relation to the real celandine, or swallow-wort, which is one of the Poppy family.

The daisy proper—the “Day’s eye” of Chaucer—is of the genus *Bellis*, while the ox-eye daisy is a *Chrysanthemum*, and the Michaelmas daisy is an *Aster*.

The name “marigold,” or gold of Mary, seems to belong most properly to the English marigold, *Calendula officinalis*, “the marigold that goes to bed wi’ the sun” of Shakespeare. It was also known as the pot marigold, the flowers being used for flavouring soups. The name *Calendula*, Gerard remarks, indicates that “it is to be seen to flower in the calends of almost euerie moneth.” French and African marigolds are *Tagetes patula* and *Tagetes erecta* respectively, and they are both natives of Mexico !

The corn marigold is a *Chrysanthemum*. Its leaves and stalks were much eaten in Gerard’s time as a pot herb. The marsh marigold, again, the “winking Mary-buds” of Shakespeare, is one of the *Ranunculus* order.

The deadly nightshade is *Atropa Belladonna*, while the woody nightshade—Keats’s “ruby grape of Proserpine”—is a *Solanum*; Enchanter’s nightshade, on the other hand, belongs to the Evening Primrose family.

The apple is the fruit of *Pyrus Malus*, but the word has been used for a large number of fruits of very diverse plants. Perhaps the most curious example of this is the pineapple, which has nothing to do with the pine, and is very far from being an apple. The term “pineapple” was first of all applied to the fruit of the pine tree—the pine cone, in fact. Then the fruit of *Ananassa sativa* having some resemblance to a fir cone, it was called a pineapple. And now no one thinks of calling the fruit of the pine tree a pineapple. Custard apples are the fruits of species of *Anona* growing in the East and West Indies. Kangaroo apples, eaten in Tasmania, and Egg apples are the fruits of species of *Solanum*. Thorn-apples are produced by species of *Datura*. Apples of Sodom are said to be the fruit of a *Solanum*.

The familiar oak-apple is not even a fruit, but a gall, a growth on the oak caused by the grubs of a gall-fly.

The pear, like the apple, belongs to the order *Rosaceæ*, but the prickly pear is a *Cactus*. And while the French call potatoes "earth-apples," they are known in Sweden as "earth-pears."

The word "currant" seems to belong primarily to the well-known dried fruit, the produce of a vine (*Vitis vinifera*), while the red and black currants of our gardens are of the genus *Ribes*, and belong to the gooseberry division of the Saxifrage order. The word "currant," indeed, is said to be an abbreviation and corruption of 'raisins de Corinth,' that is, Corinthian grapes.

The cherry is usually placed in the genus *Prunus*, of the order *Rosaceæ*, while the winter cherry is a *Physalis*, order *Solanaceæ*.

The bryony and black bryony belong to two widely separated orders. The former is the sole representative in this country of the Cucumber family, and the latter is our only native species of the Yam family.

There are many people who object to what they call the barbarous Latin names of flowers. Mr. Justin McCarthy expresses this sentiment in one of his novels as follows:—

"One stores the chambers of the mind with a variety of quaint and delightful names of plants, the names that figure in the 'Shepherd's Calendar,' and that are so many thousand times more delightful than the rigid Latin names of the scholar."

But, in the first place, the scientific or botanical names of flowers are not always, or necessarily, Latin. They are not infrequently Greek. Thus asparagus, both the popular and the scientific name of the well-known vegetable, and *Crambe*, the botanical name of sea-kale, are the Greek names of the same plants. Botanical names may even be Arabic. Thus *Nuphar*, the yellow water-lily, is from the Arabic *naufar*; while *Cakile*, the sea-rocket, and *Alchemilla*, lady's mantle, are both Arabic words also.

And as to *barbarous*—well, if the term *must* be applied either to the botanical or the common name—it is certainly not to the former. I do not propose to dwell here on the enormous advantage to science of the beautiful binomial system of Linnæus—the system of giving to each plant a generic and a specific name. I wish rather to indicate what an interesting study these botanical names may be, and to urge that all lovers of flowers ought to cultivate an acquaintance with them.

Many botanical names are picturesquely descriptive. There is a tree in Demerara known as the Hya-hya, or cow tree, because it yields a drinkable milk-like juice. It is named *Tabernæmontana utilis*, that is, the useful mountain tavern. So we picture to ourselves the thirsty traveller resting beneath its shade and refreshing himself with a draught of its nutritious and thirst-quenching sap—a useful tavern indeed!

Again, take the name of our native yellow balsam, *Impatiens Noli-me-tangere*. There is almost a touch of humour about it: "I am irritable, don't touch me," it says, which refers to the fact that if you do touch the ripened capsules they burst and throw the seeds at you, so to speak.

The deadly nightshade *Atropa Belladonna*. Atropos was one of the Fates—the Fate that cannot be avoided: and the first name of the nightshade emphasises the deadly nature of the plant—it plays the part of

Atropos, or Fate, to those who take it. Belladonna, again, in Spanish "beautiful lady," refers to the fact that the ladies of Spain used it to enhance their beauty. Injected into the eye, belladonna increased the size of the pupils, and so caused the desired languishing look.

And when we remember that the botanical name of the snowdrop is the "snowy-milk flower," that the snowflake is the "white violet of the spring," and that the *Chionodoxa* is the "glory of the snow," these lovely spring flowers seem almost more beautiful.

The ox-eye daisy is the *Chrysanthemum Leucanthemum* of botanists, and this name means the golden-flowered white flower, referring to the golden-yellow disc and white rays. Surely this is more descriptive and true than ox-eye daisy, for there is absolutely no resemblance in this flower to the eye of the ox.

The botanical name of the weeping willow is *Salix babylonica*, and though erroneous, it is not without interest. It seems to have been given under the impression that it was the willow upon which the Israelites hanged their harps by the waters of Babylon. But, in the first place, it is almost certain that the tree upon which the harps were hung was a species of poplar, which tree replaces the willow on so many Asiatic rivers. In the second place, *Salix babylonica* is known to be a native of China. It is sometimes known as Pope's willow, having been cultivated by that poet; also as Napoleon's willow, because a tree of this species overshadows his grave in St. Helena. The weeping willows of many English gardens are reported to be grown from slips of this latter.

Willow-wort, that is willow-plant, is not a willow, but a name for the yellow loosestrife. The botanical name *Lysimachia* expresses the same meaning as the English loosestrife, which is also alluded to in the line,

So willow-wort makes wonted hate shake hands.

Many botanical names enshrine those of botanists or plant-lovers, who thus obtain what Horace desired, "a monument more lasting than brass."

In the fuchsia, for example, we honour the name of the German physician and professor of medicine, Dr. Leonhard Fuchs. Fuchs, one of the fathers of scientific botany, was born in Bavaria in 1501, and attained some fame in the practice of his profession. Some two hundred years later a new genus of plants was brought from the forests of Central America: these were described by Plomier, and named by him *Fuchsia* in honour of the great German botanist. It is said that Fuchs's herbarium is still preserved in the South Kensington Museum.

Camellia, again, recalls the name of George Joseph Camellus, a Moravian Jesuit, who travelled in Asia and wrote a history of the plants of the island of Luzon, one of the Philippines. In honour of his botanical achievements Linnæus gave the name *Camellia* to the rose of Japan. His herbarium is also said to be in the South Kensington Museum.

Linnæus himself is remembered in the little pink sweet-scented flower *Linnæa borealis*, here found chiefly in Scotland. The great botanist is said to have chosen this plant to bear his name on account of some similarity between the plant and himself. It was named and described by his friend Gronovius. *Linnæa borealis* forms the device

on the book-plate of Linnæus, with the motto borrowed from Virgil, and used by him of the bee: "Tantus amor florum." His herbarium is now one of the most cherished possessions of the Linnean Society.

The name of Matthias Lobel, of Lille, is probably known to most people only in the familiar lobelia of the summer border. Lobel was a botanist and physician to James I. The lobelia first described was the less known scarlet species, the rich crimson cardinal's flower. Parkinson says of it: "It groweth neere the river of Canada where the French plantation in America is situated." The more familiar blue lobelia is from the Cape.

The dahlia is named after Dr. Dahl, a Swedish botanist and pupil of Linnæus. It was introduced into England in 1789, but the plants were soon afterwards lost. Seeds were reintroduced by Lady Holland, and so botanists changed the name to Georgiana in her honour. The name dahlia, however, had obtained firm root, and the Partington broom of botanical authority was powerless against the tide of popular use. This favourite flower remains the Dahlia. In Germany, however, Georgine is still used as a name of the Dahlia.

The pretty little purple Aubrietia of our spring gardens appropriately recalls a French flower and miniature painter, Claude Aubriet. Aubriet made the drawings for Tournefort's "Elements of Botany," and succeeded Joubert as Royal painter in the Jardin des Plantes, Paris.

The *Tradescantia*, or Virginian spiderwort, again, reminds us of the two John Tradescants, father and son, travellers, botanists, and gardeners. It was the elder Tradescant who established at Lambeth the first "physic garden" in this country. He was gardener to Charles I., and was also employed by the Earl of Salisbury and the Duke of Buckingham. John Tradescant the younger travelled much, collecting plants for the "Physic Garden," to which, in 1640, he brought the occidental plane tree. From North America he introduced many plants, among them the Virginian spiderwort, which bears his name. Like his father, he was gardener to Charles I., and made large collections of all sorts of things. These were described in a work entitled "Museum Tradescantianum," and were given to Elias Ashmole. Hence they may now be in the Ashmolean Museum, Oxford.*

Bartsia alpina may in a special sense be said to be a memorial name. The flower also, according to Kerner's description, is specially a memorial flower. "This remarkable plant," he says, "is very striking owing to the colour of its foliage being a mixture of black, violet, and green. The flower, too, is of a sombre dark-violet hue, and the entire plant, by reason of this peculiar colouring, gives a truly funereal impression." So it was chosen by Linnæus, and named by him *Bartsia* to express his grief at the early death of his intimate friend John Bartsch, a zealous naturalist and physician.

Other examples are the red alum root, *Heuchera*, from Johann Heinrich Heucher, German professor of medicine; *Rudbeckia* from Olaf Rudbeck the younger, professor of botany, Upsala; *Sherardia*, the field madder, from James Sherard, an eminent botanist; *Lavatera*, the tree

* For information regarding the Tradescants I am indebted to my friend Professor Lebour, M.A., D.Sc., of the Armstrong College, Newcastle-on-Tyne.

mallow, from the brothers Lavater, Swiss physicians; *Hutchinsia* from Miss Hutchins, a zealous Irish botanist; *Teesdalia* from Robert Teesdale, a Yorkshire botanist.

Other names thus preserved to us in flowers are those of classical heroes. The hyacinth, the "lettered hyacinth," the *Hyacinthus orientalis* of our borders, commemorates the fate of the Greek youth Hyacinthus. While playing at quoits with Apollo the jealousy of the god Zephyrus caused a quoit to strike him on the head and kill him on the spot. From his blood sprang up the flower with the word "aiai," that is, woe, written on its petals. So Keats writes:

O for Hermes' wand
To touch this flower into human shape!
That woodland Hyacinthus could escape
From his green prison.

The word "hyacinth" has been applied to a number of flowers which are not botanically of the genus *Hyacinthus*. Even our common wild hyacinth of the woods is not a true hyacinth, although Linnæus named it *Hyacinthus non-scriptus*, the not-written hyacinth. It is now classed as a *Scilla*, and named by botanists *Scilla nutans*. The grape-hyacinths, again, are of the genus *Muscari*. The Peruvian hyacinth and the lily-hyacinth are both *Scillas*.

The Missouri hyacinth is a *Hesperocordum*, and the Tasmanian hyacinth a *Thelymitra*; while the wild hyacinth of America is the pretty blue *Camassia esculenta* often grown in our borders, called by the Indians "biscuit-root," and used by them as we use onions.

But there is considerable doubt whether even the *Hyacinthus orientalis* of our borders is the genuine hyacinth, the flower which classical writers tell us sprang up from the blood of Hyacinthus. There is considerable reason, in fact, for believing that the flower celebrated by Virgil, Ovid, and others as the hyacinth was really the Martagon lily, *Lilium Martagon*. This flower, which has become naturalised in parts of Surrey, has pale-purple flowers with dark raised papillæ which may have suggested the letters "aiai."

Another mythical personage commemorated in a flower is Narcissus, the beautiful youth who fell in love with his own image. He pined away, and was metamorphosed into the flower. This, at any rate, was the view at the time of Ovid, though there is some reason to suppose that in earlier times Narcissus was the word used for what was later called the hyacinth, and was probably our Martagon lily.

Circe, the enchantress of the "Odyssey," is recalled in *Circæa*, the enchanter's nightshade, and Hercules in *Heracleum*, the cow parsnip; while *Euonymus*, the spindle tree, is named after the mother of the Furies.

Chiron, the Greek physician surnamed the Centaur, seems to have given his name to the knapweeds, botanically *Centaurea*. *Achillea Ptarmica*, again, the sneezewort, has received its name from Achilles, the hero of the "Iliad." Achilles was a pupil of Chiron, who first pointed out the virtues of the herb. It was probably then used in the treatment of wounds: it was powdered and used as snuff in more modern times. Hence its common name, "sneezewort."

The names of animals applied to plants offer some points of interest. The prefix "dog-," for example, implies a certain amount of reproach and contempt. Dog-rose separates the humble wild rose of the hedges from the stately queen of the garden. "Nay," says Theocritus, "ye may not liken dog-roses to the rose." So the term "dog-violet" reproaches a beautiful flower with being scentless. "Horse," again, seems to hint at something large and coarse: horse-radish, the large strong-flavoured radish; horse-chestnut, the large un-eatable chestnut.

In some cases there seems to be no reason for affixing the name. Thus various plants have been named after the cuckoo, none of which are in any way specially associated with it. Thus the wood sorrel is cuckoo's bread; the ragged robin is the cuckoo flower or cuckoo gilly-flower; the spotted arum is cuckoo pint; lady's smock is also cuckoo flower; while Shakespeare's "cuckoo buds of yellow hue" are probably a species of crowfoot.

Hawkweed and hawkbit were so called because hawks were believed to clear their eyes with them. The botanical name of the hawkweeds, *Hieracium*, also is from the Greek *ἰέραξ*, a hawk. *Euphrasia*, or eye-bright, gets its name from a similar use. To "purge the eyes with rue and euphrasie" was a common expression.

Goose plants, again, are numerous; as goose-bill, goose-corn, goose-grass, goose-tansy, goose-foot, goose-tongue. None, however, seem to be very appropriately named.

Fuchs is German for "fox," and the botanist Fuchs, whose name is commemorated in Fuchsia, is also associated with the foxglove. It was Fuchs, in fact, who suggested the botanical name "digitalis" as a suitable equivalent to "Fingerhut," that is, thimble, the German name of the foxglove. Now the word "foxglove" has given rise to some discussion. On the ground probably that foxes do not wear gloves, it has been suggested that folks' gloves, that is, fairies' gloves, are meant. But it appears that in Norway the foxglove is known as Ræv-bielde and Ræveleika, fox-bell and fox-music. And this arises from its resemblance to a favourite musical instrument of earlier times, a set of bells hung on an arched support. So the word "foxglove" may have been originally foxes-glew, that is, fox's music, "glew" being Anglo-Saxon for music.

The name "yeveering bells" or "yethering bells" applied to the *Pyrola* is founded on a similar idea. "Yethering" is from the Scotch "yether," to beat, and the flowers are supposed to be little bells hung one above the other to be struck by a hammer, and so make music.

We call the rose the queen of flowers, and the Chinese call the tree peony *meu-tang*, the king of flowers. In Greek it was *παῖωνία*, from *παῖων*, a god of physic. Hence our *Pæonia* and peony.

The tobacco plant has got its name through a curious mistake. The Spaniards adopted the word from the Indians of Cuba, but instead of taking the word "cohiba," which was the name of the plant, they took "tobacco," which was the name of the pipe in which it was smoked. The botanical name of the tobacco plant, *Nicotiana*, is in honour of Jean Nicot, French Ambassador to Portugal, who sent seeds of the plant to Queen Catherine de' Medici.

The pansy is said to have received its name from its quaint shape.

It is the French *pensée*, that is, thought, the "There is pansies, that's for thoughts," of Ophelia. It provokes thought or fancy. Botanically the pansy is a *Viola*, derived by cultivation from *Viola tricolor*, and perhaps others. Florists, however, seek to restrict the word "*Viola*" to a strain of bedding pansies, thus ignoring the fact that all pansies are *Violas*. A country gardener, a great prize-taker at the local shows, heard of the much advertised *Violas* and determined to try some. "They were nobbut *pansies*," he remarked contemptuously after seeing them flower, "and not very good 'ens at that!" So the florist who grows his prize *Ranunculus* ignores the fact that the plebeian buttercup which disfigures his lawn is also a *Ranunculus*. And in using the words "*Hepatica*" and "*Auricula*" we lose sight of the fact that the former is an *Anemone* and the latter a *Primula*.

The word "gilly-flower," so much used by ancient writers, is a curious one. It has been suggested that it is a corruption of "July flower." But this is too easy for the etymologists, and so they have derived it, through the Italian and French, from the Latin *Caryophyllus*, the pink or carnation, and it seems to belong most properly to the clove pink, though the word "gilly-flower" has been applied to the wallflower and others.

PARASITIC AND SAPROPHYTIC PLANTS.

By Rev. Professor G. HENSLOW, M.A., F.L.S., V.M.H., &c.

[Lecture delivered on March 20, 1906.]

GENERAL OBSERVATIONS.—Parasitic and saprophytic plants are distributed over many orders of flowering plants as well as genera of fungi. In the division *Thalamifloræ* of Dicotyledons there is only one ; in *Gamopetalæ*, seven ; in *Incompletæ*, five ; while in Monocotyledons there are four.*

Their most obvious feature, in a large proportion at least, is the total absence of any green colouring matter or chlorophyll. All such are, therefore, incapable of assimilating purely inorganic food materials, and must depend wholly upon living plants as hosts, or decayed organic matter in the soil. It was supposed, however, in this latter case, which applies especially to Saprophytes, that their nutrition depended on the aid of a fungus mycelium, which covers or penetrates the roots and supplies the plant with nitrogenous substances. Such at least appeared to be the most probable interpretation of this curious condition of symbiosis. At the present day such fungi are more truly parasitic, as will be described.

Since it is presumable, on the score of structural affinity, that greenless parasites and saprophytes have descended from green plants, it is not surprising to find that many such are parasitic, although they can derive nourishment to some limited extent by their ordinary roots and leaves. As an example, species of *Pyrola* or Winter Green, among the heath family, supply us with a transition through the leafless species *P. aphylla* to the order *Monotropaceæ*, which some botanists separate from *Ericaceæ* because of their totally greenless condition. It includes four genera, one of which, *Monotropa Hypopitys*, is British. Again, the order *Scrophularineæ*, which contains numerous non-parasitic genera, as the Foxglove, Snapdragon, Musk, &c., has a tribe, *Euphrasieæ*, containing eighteen genera, six of which are British, and all but one have green leaves. They are also all parasitic, and on grass roots. From this tribe one passes to the order *Orobanchaceæ* or Broom Rapes, which are entirely greenless.

Numerous parasites exist in the order *Fungi* of cryptogams, while all the rest are saprophytes, none whatever having any chlorophyll at all.

Flowering parasites attach themselves by penetrating root-hairs to their "host" plants, or by means of suckers called haustoria ; these are disc-like elevations produced by the superficial tissues, from the centre of which the root-like process arises, which penetrates the stem of the host, and then grafts itself upon the living tissues beneath the surface of the latter.

* In Dicotyledons there are the following orders :—*Polygaleæ*, *Ericaceæ*, *Monotropaceæ*, *Lennoaceæ*, *Gentianeæ*, *Convolvulaceæ*, *Scrophularineæ*, *Orobanchaceæ*, *Lauraceæ*, *Loranthaceæ*, *Santalaceæ*, *Balanophoreæ*, and *Cytinaceæ*. In Monocotyledons *Melanthaceæ*, *Triurideæ*, *Burmanniaceæ*, *Orchideæ* are orders containing plants which appear to be saprophytes rather than true parasites.

Illustrations of Methods of Parasitism.—Commencing with the mistletoe (*Viscum album*) of the family *Loranthaceæ*, containing thirteen genera and 500 species, this has very glutinous berries, easily adhering to boughs; so that the embryo, by its radicle turning away from the light, penetrates the bark of the tree, and then spreading along the cambium layer thrusts “sinkers” inwards into the wood and roots into the cortex, as well as sends shoots outwards into the air. The sinkers absorb water, &c. Having green leaves they can utilise carbon-dioxide from the air, and only require water and minerals from the host. They somewhat resemble a scion on a stock. *Loranthus europæus* has been shown to surrender organised matters to its host. It thus to some extent lives in symbiosis with it.

The genus *Viscum* has at least thirty species, while the British one has several varieties. Such can only arise in consequence of variations in the trees and climate. In South Africa there are several species; one has very minute leaves, a feature in common with many herbs in that excessively dry climate; one in Australia is densely pubescent, from a similar cause.

Several members of the family are non-parasitic, as shrubs and trees, showing that the parasitic habit is an acquired one.

As terrestrial parasites I will take the leafy Cow-wheat, and a leafless one, the Dodder. M. Leclerc du Sablon* has well described the formation of the suckers of the former, *Melampyrum pratense*, observing that this plant, which possesses green leaves, is not always attached to host plants; for many individuals fix themselves, often indeed the greater number, on decomposing pieces of wood or even simply to a packet of humus very rich in organic matters. *Melampyrum* sometimes, indeed, has no attachment to a host plant at all, and so far becomes a saprophyte instead. It has, therefore, three methods of obtaining nourishment, by normal roots, by saprophytic and by parasitic suckers. The external cause of their formation appears to be the stimulus excited by the contact of a body, living or dead, which encloses nutritious (nitrogenous?) matters useful to the plant. The first stage of the development of a sucker in *Melampyrum* consists of a slight protuberance, due to a swelling of the cortex or superficial tissues of the root of the parasite. The cell of the epidermis, where contact takes place, enlarges tangentially until it acquires a breadth six to eight times greater than its primitive size. It is thus enabled to give rise to a cluster of cells which elongate outwards into papillæ or root-hairs. These latter now undergo a remarkable change. They form a conical bundle, more or less compact, and are thus enabled to penetrate into the tissues of the host plant. If such a sucker pass into dead vegetable matter, the extremities branch and ramify through it. The corresponding cells, beneath this terminal cluster of root-hairs, of one or two subjacent layers, undergo analogous modifications. Each of them is now transformed into a row of cells along the axis of the sucker till there are about ten rows forming a bundle running up the sucker into the root of the parasite and down to the root of the host. These acquire spiral thickenings, and so become “tracheids” in

* *Bulletin de la Soc. Bot. de Fr.* 1886, p. 154; and *Ann. des Sci. Nat.* sér. 7, tom. 6, 1887, p. 90.

communication with the spiral vessels in the root of the parasite. At the other end the bundle of root-hairs, now modified as absorbing organs, penetrates the cortex of the root of the host plant, dissolving and consuming it by means of a ferment; but they are stopped by the woody central cylinder, which resists the solvent action of the ferment; consequently they bend round and invest this central cylinder.

The part of the sucker of *Melampyrum* which enters the host plant has thus the epidermal layer for its origin. In *Rhinanthus*, the Yellow Rattle, additional root-hairs (*i.e.* besides those forming the penetrating cone) can invest the root of the host and take part in absorbing nourishment from it. These, however, do not become spiral tracheids like the former.

Other genera show various slight differences, but the general principle on which the suckers are formed in the *Euphrasiæ* is the same; that is to say, the sucker is epidermal. From the above brief description it would seem that these leafy parasites supply us with a somewhat primitive type of parasitism; first, in their having green leaves, and secondly, in that the effect of the irritation is more superficial than in the greatly degraded state of leafless and greenless parasites; such as *Cuscuta*, to be next described, in which the irritation acts more minutely on the deeper-seated cortical tissues, wherein is formed the absorbing organ; while in the *Euphrasiæ*, as we have seen, the suckers are formed by the epidermis alone.

The method by which an aerial leafless parasite fixes itself to a host plant is well illustrated by *Cuscuta*, the Dodder. The seed of this plant has no cotyledons and resembles a minute coiled thread. It germinates by fixing its club-shaped root-end in the soil and draws up water by means of root-hairs; it then sends up a thread-like stem, which circumnutates like a tendril in search of a support. As soon as it comes in contact with a suitable host plant it quickly forms an adhesive "haustorium," and from that moment the lower part dies and the dodder becomes entirely parasitic and grows rapidly all over the host plant.

If the seedling fails to find a host its stem falls to the ground, and provided the soil be moist, the apex will grow while the root-end dies. The nourishment is then continually being transferred from one end to the other as the stem, as well as the root-end, dies from below upwards. The little plant thus "moves" along, as it were, by growth until it may come in contact with some suitable plant. If it fail to do so it will of course perish in time.

In circumnutating it forms two kinds of spirals. If it be growing rapidly, the coils are loose and it fails to form haustoria; but when this period of rapid growth is over, it coils in more horizontal spirals closely adpressed to the host plant. It is on these alone that the haustoria are formed.

The sucker originates at a point *within* the cortex, where a focus of "merismatic" or rapidly dividing embryonic tissue is formed. This invades the central region of the stem of the dodder and also extends outwards. Vessels are now formed in this, and become united to the central cylinders of both host and parasite. In *Cuscuta* the epidermal

cells of the aerial stem become "claspers," and then the sucker penetrates through the middle of them. This fixation of the cup-like clasper appears indispensable to complete the development of the penetrating sucker. For when the epidermal cells do not prolong themselves into clasping organs the sucker which arises within them undergoes an arrest of development, and does not form vessels. From this it appears that either the hairs are the vehicle of irritation, which must be kept up, and by conduction influences the deeper tissues, which in response begin to form the absorbing organ from within; or it may be that the "purchase" required for the necessary force to drive the sucker root into the host is insufficient.

The epidermal cells between any two suckers help mechanically to fix the plant. Their cuticle presents fine indentations which mould themselves upon the corresponding asperities, fitting into depressions of the cuticle between the adjacent cells of the host. And they adhere still more firmly by means of a gummy secretion.

The means by which the root sucker or haustorium penetrates the host is mainly by pressure, leverage being secured by the closeness of the coils together with the superficial adhesion mentioned above. Besides this the central epidermal papillate cells dissolve a passage and absorb the nutriment which is conveyed to the root immediately below them. As they are not the true sucker (as in the *Euphrasiæ*), this epidermal sucker is called the "pre-haustorium."

Experiments show that although no chlorophyll is visible in *Cuscuta* as a rule, it can be induced to form it; for if short lengths be cut off a branch, the failure of sufficient nutrition—in the supply of food from below, necessary for the formation of haustoria, being removed—is now compensated for by the immediate formation of chlorophyll. Similarly if the *Cuscuta* be attached to a feeble host, or to one which cannot nourish it properly, as *Euphorbia*, it puts on chlorophyll, so as to be more independent of its host. When, however, fresh haustoria have been made on a fitting host, then the chlorophyll disappears and perfect parasitism is again recovered.

Parasitism, Potentially General.—That the power to become parasitic is a general one seems obvious from the fact that parasites occur in widely different orders, and that even a passion flower happening to have its roots adjoining those of a *Euonymus japonica* became parasitic upon it.* But why some roots when in contact with others are stimulated by the latter into producing suckers, rather than *vice versa*; or why they are not naturally parasitic, is as obscure as the answer to the question why some marsh plants have become insectivorous, while others associated with them have not.

The point, however, which may be insisted upon is, that parasitism is a consequence of organic irritation, as described in *Melampyrum*. This, when once fully set up and continued for generations, induces a hereditary predisposition to parasitism; as seen in many of the tribe *Euphrasiæ* of the order *Scrophularineæ*. This, again, by further degradation in the structure of the parasite, as in all which are devoid of chlorophyll, becomes a fixed and absolutely necessary habit of life.

* *Rev. Gén. de Bot.* vol. xvi. p. 453.

Degradations in the Structure and Functions of Parasites.—The most obvious sign of degeneracy in many parasites is the want of chlorophyll. They might be grouped artificially into chlorophyllous and non-chlorophyllous. Such represent different stages in degrees of degeneracy; for although the presence of green leaves in the group *Euphrasieæ*, such as *Rhinanthus*, *Bartsia*, *Euphrasia*, *Melampyrum*, &c., would lead one to conclude on a *a priori* grounds that they could assimilate carbonic acid just as ordinary flowering plants, yet M. G. Bonnier has discovered that the above-mentioned genera, excepting the last, which in other respects differs somewhat from its allies, do not disengage oxygen in light, whatever be its brightness or the method of investigation employed. The interpretation of this remarkable fact is that the assimilative power is so enfeebled that the oxygen emitted is all reabsorbed for respiration, there being no excess to be given off as in the case of all non-parasitic flowering plants.

Great degeneracy of structure is seen in both the vegetative and reproductive systems of parasites, and also of saprophytes. Besides the total absence of chlorophyll, the leaves of such parasites which have none are reduced to scales or are absent altogether. The microscopic details follow suit in the general absence of stomata, &c., while the fibro-vascular cylinder of the stem exhibits various anomalies, reminding one of the structures in stems of climbing plants and Monocotyledons. The great dislocation of the cords is a result of parasitism, just as it is in climbing stems, and is also a result of an aquatic habit, which has set up the well-known arrangement in Monocotyledons.* In the case of the flowers of parasites a very common feature of degeneracy is seen in the ovules, &c. For, while a normal ovule, say of a buttercup, would consist of a central nucellus containing the embryo sac within it, and surrounded by two coats, in some parasites, as the mistletoe, there is nothing but a naked embryo sac. When an ovule becomes a seed, the embryo, instead of having two cotyledons a plumule and a radicle, may remain arrested in the pro-embryonic condition of a globular cellular body, the outermost skin of the seed being a simple cellular sac. Such seeds, for example, occur in *Orobanche*, *Rafflesia*, *Balanophora*, &c. This kind of degeneracy in the reproductive system seems to be one of the first conditions, for it occurs in plants unsuspected of parasitism on other grounds, from which true parasites have descended, as, e.g. *Pyrola rotundifolia*, from which genus the greenless saprophyte *Monotropa* has probably been derived. Again, the orders *Loranthaceæ*, containing the mistletoe, and *Santalaceæ*, the parasitic genus *Thesium* and others are allied to *Olacaceæ*, in which the embryo is reduced to a nucleus, the coats being undifferentiated. But this order does not contain known parasites.

Parasites assisted by an Insectivorous Habit.—Parasites, and saprophytes as well, are of course at a great disadvantage in having to depend upon other plants, &c. for existence, for unless a seedling can soon attach itself to something it must die. Two cases are known in which nature has come to the assistance of the parasites, by furnishing them with the means of catching insects from which they can derive some nitrogenous

* *Origin of Plant Structures*, pp. 206, 214, 220 and 149, 178.

food, viz. *Bartsia alpina* and *Lathræa squamaria*, both belonging to the tribe *Euphrasieæ*, mentioned above.

This species of *Bartsia* produces little buds underground, the leaf scales of which contain glands on their inner surface capable of absorbing animal matter, while the numerous fleshy scales which cover the rhizomes of the toothwort (*Lathræa*) are provided with chambers, into which minute creatures crawl and are thus digested; certain glands putting out protoplasmic hairs to catch the prey, while other glands appear to absorb the nourishment.*

Saprophytes.—With regard to the origin of saprophytes, it has been suggested from their abundance in tropical forests—the whole number of species known being 160, 122 of which are tropical—that they arose in the deeper and darker parts of the forest, where assimilation by sunlight was greatly impeded, in a soil rich in nutritious matters resulting from the perpetual decay of vegetation. Another possible origin of many greenless saprophytes may be that they were formerly parasites which have changed their habit of life in now living solely on decomposing organic matter. Greenless saprophytes, therefore, if they were presumably at first parasites, lost their parasitic habit, and became changed to saprophytes where light was feeble.

Although this would seem probably to have been sometimes the case, it does not preclude the possibility of an ordinary green plant becoming saprophytic. As a case in point, a species of Fern (*Gramatophyllum*) has been known to produce its aerial roots among decayed vegetable matter. In this case on a careful examination I found that the surface of the roots in contact with it had developed quantities of “absorbent hairs.” These were doubtless induced to be formed by the presence of nutritive matter.†

In another case I found that the rhizomes of a musk plant happened to have penetrated a rotten log, running parallel with the grain. They were quite white. Each branch terminated with a bud composed of very arrested scales. The outermost tip protecting the apex was hardened and brown (physiologically acting as a root-cap). The epidermis was without any stomata, delicate and “epithelioid” in character. It had a thick cortex of thin-walled cells apparently full of water. There was a very small central cylinder. Fine thread-like roots were sparingly given off. These were covered with extremely delicate unseptate hairs penetrating the wood in all directions. So far they would seem only to have absorbed water, but on testing the starch, which was sparingly scattered through the cortex, I found that it assumed a bright red colour with tincture of iodine, and not the usual violet tint. Now, this red colour is characteristic of saprophytes.

Special Peculiarities of Saprophytes.—It has been already suggested that greenless saprophytes are a secondary result of parasitism. Some, such as the green-leaved *Melampyrum*, can derive nourishment from dead wood much in the same way as it does from a living root; but the formation of specially absorbing organs like those of parasites is not known,

* They will be found both described and figured in Oliver and Kerner's *Natural History of Plants*, i. p. 137, fig. 25.

† *Journal R.H.S.* vol. xvi. p. xxiii, 1893.

or rarely so, in ordinary flowering plants. Perhaps the nearest approach to them may be seen in members of the order *Leguminosæ*. These produce nodules on their roots, and very large coral-like masses occur on the roots of *Cytisus Laburnum*, very suggestive of the rhizomes of the saprophyte *Corallorrhiza*, an orchid. A closer analogy obtains between them in that they are infested by fungi. The fungus, assuming a bacterioid form in the *Leguminosæ*, is supposed to be able to fix the nitrogen of the air, which, by some mysterious power, is conveyed to the host plant, which is thereby benefited by the process. This union of two organisms where one benefits, without preying upon the other, is called "symbiosis." In the case of saprophytes a mycelioid fungus invests the surface or deeper layers of the cells of the root. This is called *Mycorrhiza*, and the richer the soil the more marked is its presence. In *Sarcodes* (ord. *Monotropaceæ*), a saprophyte of California, Professor Oliver found that it forms a dense felt-like covering over the roots, the fibres penetrating between and separating the epidermal cells, but they do not penetrate deeper in that plant. In *Neottia* and *Corallorrhiza* they invest and enter the large cells of the cortex, which contains much nitrogenous matter.

These discoveries * were first made in 1840, and it was suggested by Pfeffer, in 1877, that the mycelium and the host had a symbiotic connection. It was Frank, in 1885, who emphasised its importance and carried out experiments to prove its reality. In conifers and amentales the fungus is external or "ectotrophic"; but in orchids and a vast number of other plants it is internal or "endotrophic."

In the case of the former Frank regarded the mycelium as a substitute for root-hairs, fulfilling their function. The fungus was thus supposed to absorb nourishment, such as mineral salts and nitrogenous matters, from the humus and convey them into the roots of the "host."

In return the plant, it was thought, supplied hydrocarbons to the fungus.

Frank's experiment consisted in sowing fifteen beech seeds in humus, which developed properly; but fifteen in sterilised humus and in quartz sand either died or remained stunted.

From 1885 to 1894 saprophytic angiosperms were much studied, and the constant presence of endophytic fungi in their *greenless* parts proved to exist. The fungus occurring in the tuberous roots of orchids was believed to have been traced to belong to *Fusarium* and *Nectria*.

Sarauw, however, in 1904 showed that the mycelium was not so indispensable to their arboreal "hosts" as Frank had supposed. Many roots grew rapidly, and so freed themselves from the mycelial covering. Moreover Von Tabeuf, in 1903, showed that radical hairs are by no means totally absent and many roots had no mycelial investment. He thought the ectotropic fungus absorbed salts for itself from the humus and made nitrates for the angiosperms. Stahl also had, in 1900, observed that trees supplied with plenty of water abounded in starch and salts and were devoid of mycorrhiza; but those with a deficiency, comparatively speaking, had more sugar and were always associated with mycorrhiza, receiving

* The following is a brief epitome of important facts in a series of papers by M. Gallaud, "Etudes sur les Mycorrhizes Endotrophes," in *Rev. Gén. de Bot.* vol. xvii. 1905.

their salts through it. Hence it was inferred that mycorrhiza was especially necessary in forests where absorption and transpiration are reduced.

Neottia Nidus-avis, the bird's-nest orchis, has long attracted attention. Prillieux * has described the rhizome and roots, showing that each root can develop into a new rhizome having a bud at the apex, and that the hypodermal cells are infested by the mycelium of a fungus which was supposed to act symbiotically; but later investigations by M. Bernard † show that the hypha enters the undifferentiated embryo by the suspensor end, and as the latter develops it begins to form a tubercle, to "shut off" the fungus, so to say, producing much starch in the zone beyond the line of infection.

As the rhizome elongates the hypha penetrates every new root and internode of the rhizome, the axillary buds being unable to develop until "tuberisation" has become more vigorous and the floral shoot manages to develop itself.

This orchis, like numerous other infested plants, would seem to finally consume the parasite (though Gallaud suggests the term "internal saprophyte"), for such it appears to be, inasmuch as brown substances take the place of the "tangles" (Fr. *peloton*) of hyphæ within the cells.

M. N. Bernard discovered that the tuberous roots of orchids are always infested, the fungus entering the roots as soon as they penetrate the soil, and tuberisation begins immediately afterwards. If the roots are slow in developing, so is tuberisation. Hence it is inferred that infection is a determining condition of tuberisation.

Tracing the infection from the seed of *Cypripedium*, it is found that the fungus hypha enters by the suspensors and rapidly invades more than half the oval, undifferentiated embryo. The epidermis is alone avoided. As it advances and makes "tangles" in the cells a zone of cells is formed above the infected part, the nuclei increase greatly in size, and starch is formed. The hypha then consumes this starch as it enters the cells progressively. After a time the hypha and its protoplasm are digested by the host and destroyed, and the cell becomes dead. The healthy part of the seed now continues to grow, so that the living portion of the fungus becomes restricted to the basal part. At this stage an axial fibro-vascular bundle is formed and an endogenous root appears above with absorbing hairs. These parts are quite immune, and leaves then begin to arise. The fungus, thus confined to the base of the embryonary tubercle, vegetates, but grows no further, so that the stem and rhizome are entirely destitute of the endophyte.

Though the roots are at first quite free from the fungus they may become infected from the soil, where the fungus is present. In the struggle between the parasite and the cells, which it invades, the adversary has finished by succumbing.

The conclusion arrived at by M. Bernard is that "in an aseptie medium the embryos (as of *Cattleya*) show signs of development; but their evolution is arrested at a very early stage. This period can only be passed

* *Ann. des Sci. Nat.* 4^e sér. v.

† "Études sur la Tubérisation," *Rev. Gén. de Bot.* xiv.

after invasion by the fungus, provided there be suitable conditions of culture as well." These consisted of a certain degree of moisture for *Cypripedium*, but not for *Cattleya*, as this latter is naturally a xerophytic epiphyte; thus M. Bernard expresses it: "*Cattleya* accepted readily an aerial life, while *Cypripedium* prospered only upon a medium constantly moist." Hence, he adds, "*Cattleya* must have two conditions for successful germination, epiphytism and being infested by the fungus."

Otherwise "the 'spherules,' i.e. embryos, die without having passed a diameter of 500μ to 600μ , and without forming a leaf." "In the absence of the endophyte the differentiation of hairs is possible, but their growth never takes place."

*Bletia** exhibits a peculiarity distinguishing it from *Cattleya* and *Cypripedium* in germination. The embryo is a little more differentiated, having a rudimentary cotyledon in the form of a semicircular elevation. It can grow to a certain extent without the endophyte, but not longer than three months, when it dies from below upwards. This is the critical period, when it requires the endophyte. This first penetrates the basal cells of hairs of the hypocotyl, but subsequently the hairs themselves. The internodes successively infested accelerate their development, as soon as they are invaded, by individual growth of the cells. The endophyte thus "acts at a distance," as it enters them only after the internodes and hairs have completed their growth.

The plantlets produce no roots if uninfected, but after infection they are capable of making them through the indirect stimulation of the fungus.

In practical cultivation, to obtain success, orchids must be sown in an infected soil, in which the same species has grown; but other conditions are necessary, as a proper degree of moisture, of temperature, of light and aëration.

Although the undifferentiated seeds of orchids appear incapable of germinating without the "start" given to them by the stimulus of the endophyte a large number of plants are now known to be infested by endophytic fungi, which are more strictly to be called parasites. M. Galaud describes and figures roots invaded by endophytes in species of *Ranunculus*, *Parnassia*, *Tamus*, *Arum*, *Allium*, *Ruscus*, *Paris*, *Ornithogalum*, *Colchicum*, *Sequoia*, *Angiopteris*, *Ophioglossum*, and *Pellia*.

After penetrating the epidermis the mycelium either passes along the intercellular passages or becomes intracellular, when it coils up, making "tangles" (*pelotons*) and throwing out "tufts" (*arbuscules*) of finely dichotomising branchlets. These absorb the starch in the cells, converting it into sugar. The nucleus and protoplasm do not appear to be affected, at all events materially, for they secrete a ferment which, in turn, destroys the fungus, which is consumed by the host. As the endophyte only attacks the starch and the pectic "middle layer" of the cell-wall, M. Galaud calls the mycorrhiza an "internal saprophyte," which ends by being consumed itself.

Such is the brief description of some of the peculiarities of these remarkable plants. They point out the wonderful property of self-adaptation which runs through the whole of the vegetative world, fitting

* "Recherches Expérimentales sur les Orchidées," *Rev. Gén. de Bot.* xvi. p. 405.

the organism to its environment, whatever that may be; but if it be asked *how* or *why* the living protoplasm is capable of so doing, it is utterly beyond the powers of man's investigation to find an answer, and will probably remain an insoluble problem.

Mycodomatia of the Leguminosæ.—With regard to the well-known "nodules" on the roots of leguminous plants, these have been studied by various botanists. The following brief account is given in Dr. K. Freiherr von Tubeuf's "Diseases of Plants," p. 101 (1897): "These tubercles are accessory formations of the primary root-rind and are furnished with vascular bundles connected with the root bundles; they consist of a cortex of normal cells surrounding an inner large-celled parenchyma with turbid cell contents, consisting of numbers of bacteria (*Bacterium radicola* or *Rhizobium leguminosarum*) (1886)."

Frank describes the formation of these tubercles,* according to his view, as follows: "The short, rod-shaped microbe forces its way into a root hair or epidermal cell, multiplies there, and is conducted to the inner cortical cells by plasma threads continuous through the cell walls. A rapid division of the inner cortical cells is set up, till a tubercle is formed, which may still further increase by continued cell-division from a meristem at its apex. The bacteria multiply simultaneously, and are transferred into the new cells, where a great change comes over most of them. They enlarge and become club-shaped or dichotomously branched bodies or 'bacterioids.' Brunchorst found the contents of these to disappear at the time of the fruit-formation of the host plant.

"The great importance of the tubercles of Leguminosæ is that the plants bearing them are capable of taking up free nitrogen from the atmosphere and utilising it, while without the tubercles they could not do so. If Leguminosæ be grown in soil rich in nitrogenous food substances the tubercles are not so well developed." *How* they fix free nitrogen still seems to be a mystery.

Turning to Prof. Marshall Ward's paper† (of earlier date than Frank's "Lehrbuch") one discovers several points in common with those of M. Gallaud. Briefly, according to him, the impregnation is as follows: "A hypha takes its origin from a brilliant granule, presumably one of the granules called by observers bacteria or bacterioids. It passes down the cavity of a root hair, traverses the cortex of the root, beginning to branch where it enters the mass of tissue of the young tubercle. . . . It is often possible to see the hyphæ running in the substance of the cell-wall (M. Gallaud detected hyphæ of *Arum maculatum* apparently living on the pectic 'middle' layer. The hyphæ send out branches which end blindly in the cavities of the cells. These branches may be simple or they may have several rounded or tufted bodies (apparently agreeing with M. Gallaud's vesicles and arbuscles), looking like haustoria" (the very purpose assigned to them by M. Gallaud).

"Whence arise the bacterium-like corpuscles? They seem to be budded off from the projections of the hypha in the cells in large quantities. They then multiply further by *budding in the cells*. This explains their shapes, which are Y and V shaped.

* *Lehrbuch d. Botanik*, 1892, p. 271.

† *On the Tubercular Swellings in the Roots of Vici Faba* (1887).

"Their rapid increase in the juices of the cell would give rise to the vacuolation of the protoplasm (the *plasmodium* of some observers). At this time also vigorous specimens have these cells abundantly supplied with starch at the period when the increase in size of the cell and coincident multiplication of the gemmules occur." (Precisely as in a germinating seedling of *Neottia Nidus-avis*, starch appears abundantly just where the endophyte is most active.*)" "This causes the cells to grow (hypertrophy), and by the time the hypertrophy has ceased the gemmules in that particular cell have ceased to multiply.

"The tubercle now passes into a state of rest; it is a mass of cells full of yeast cells, gemmules, germs—so tiny that they might well be, as they were, mistaken for bacteria. The rotting of the tubercle liberates these into the soil . . . and an extended acquaintance with these 'germs' and their numbers leads one to feel no surprise if they turn out to be the ubiquitous germs which it has been suggested must exist to account for the universality of the root tubercles."

Prof. Ward regarded the fungus as a member of the *Ustilagineæ*.

Miss M. Dawson, who has re-examined the nodules (1900), shows how the bacterioids grow and multiply, forming X, Y, and V shaped bodies by budding, but considers it impossible now to classify them with the *Ustilagineæ*, but says, "It must be confessed that it is impossible as yet to assign them to any other group if not to the *Schizomycetes*."

* "Etudes sur la Tubérisation," par M. N. Bernard, *Rev. Gén. de Bot.* xiv. pl. ii. fig. 11.

ANIMATED PHOTOGRAPHS OF PLANTS.

By Mrs. DUKINFIELD H. SCOTT, F.L.S.

[Lecture given on April 3, 1906.]

THE photographs shown at this lecture were a continuation of the work on which I have been engaged for some years, and of which an account

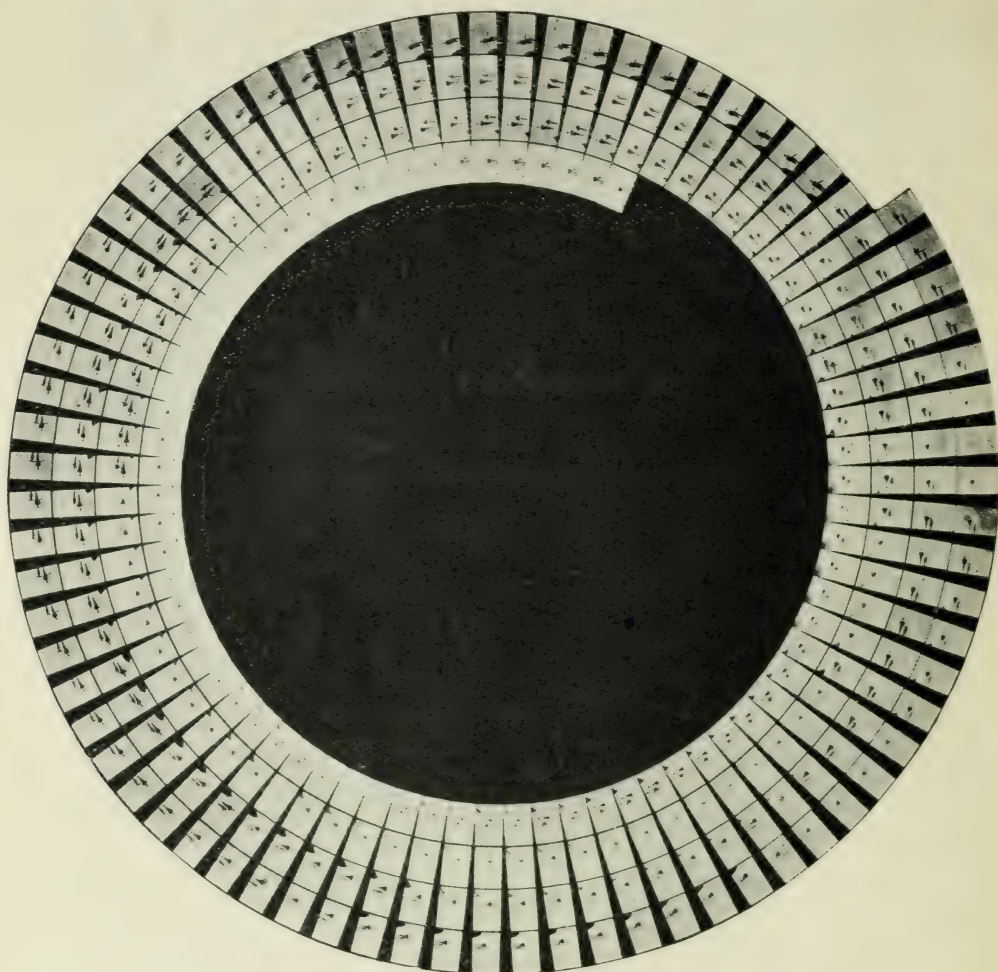


FIG. 4.—PLATE CONTAINING 350 PHOTOGRAPHS, No. 1 BEING THE FIRST OF THE INSIDE WHORL.

has already been given in the "Annals of Botany," vol. xvii. No. 68, September 1903, and in "Knowledge and Scientific News" of May 1904. A full description of the kind of cinematograph used and of the adaptations made for this work will be found in either of these papers.

Nos.

1	8	15
2	9	16
3	10	17
4	11	18
5	12	19
6	13	20
7	14	



FIG. 5.—TWENTY ENLARGED FIGURES SELECTED FROM FIG. 4.

(To face p 48.)

An ordinary cinematograph picture reproduces *rapid* movements of living objects. The purpose of my pictures is to show at an accelerated speed *slow* movements which cannot be watched by the eye, such as the growth of the young plant from the seed, the opening of a flower and development of the fruit, the movements of a climbing plant, &c.

Thus I have been able, by taking photographs at uniform intervals throughout the day during many weeks, to show these photographs in a cinematograph,* so that the growth and movements of the plant made during these weeks can pass before the eyes in a few seconds. After a warm rain we often say that we can almost see our plants growing; by means of this adaptation of the cinematograph we literally can.

At the end of this Paper will be found a list of the slides shown. I have had a reproduction made of one of the plates—that of the *Fuchsia*—and propose to give a more detailed description of this.

In fig. 4 we see a photograph of the whole plate holding 350 photographs. This represents three weeks' work. The plate was begun on March 22 at 7.30 A.M. The small bud was chosen and carefully placed in the upper part of the field, so as to allow for its growing in size as the flower developed. Photographs of it were then taken at regular intervals. For each photograph an actinometer reading had to be made, as they are photographed at all times of day, and the variation in light is enormous. The early morning and evening photographs were taken by artificial light, an incandescent methyolated spirit lamp being used.

Gradually the bud grows in length, drops as it grows heavier, swells. After a week cracks appear between the sepals, and the latter suddenly separate, the dark-red corolla begins to appear, the sepals curve upwards, the first four stamens grow out below the corolla and burst, then the second whorl of stamens grows out and bursts open, then the style grows down and lengthens; after nearly another week the petals fall off, then the sepals, and we have nothing left but the young fruit.

Theoretically I ought to have been able to continue the photographs until the fruit ripened and became a berry, but here the limitations of my machine come in, as each plate will only hold 350 photographs.

The plate is developed exactly as one would develop an ordinary photographic plate: a positive plate is printed from it, and it is ready to be put into the machine and thrown on the screen.

Then we can actually see the bud swell and open, and can watch the progress of the flower till it becomes a fruit; thus we are able to watch what the eye unassisted could never see.

Still more curious are the movements which reveal themselves by means of this method. We see the stamens gradually moving outwards away from the style, and the bud is seen during the whole time to have a curious pendulum movement, for which as yet I have no explanation to offer.

Another use to which I have put my machine is to show the movements of climbing plants. One plate shows a Mexican climber, *Maurandya*,

* The cinematograph used for this work was invented by Mr. Kamm, 27 Powell Street, Goswell Road, E.C., and is called the "kammatograph." I am much indebted to him for the kind help which he gave in adapting his apparatus to my special purpose.

which climbs by means of its leaf-stalks. This plate was begun on May 17 and took sixteen days. Photographs were taken at forty-minute intervals during the day up to 11 P.M. Each jerk, which may have been noticed when watching this on the screen, represents a night. I had no mechanical method of taking the photographs, so that the period between 11 P.M. and 6 A.M. is not represented. I have a plate of *Sparmannia africana* in which the night gaps are only four and a half hours, as I began at 4.30 in the morning; but one's energy is not always equal to keeping this up for three weeks at a time.

I began photographing the *Maurandya* when there was only one small leaf developed; at the end of the three weeks two leaves had grown and finally clasped the support.

When the photographs are thrown on the screen, one is able to watch the many curious movements: the circumnutation of the apex of the stem and the gyrations of the leaves themselves; sometimes these turn completely upside down; then one sees them clasp the stem, let go their hold, the leaf-stalk grows in length, and the process is repeated till the final clasp is made.

Plate of a Humble-Bee on a Scabious.—This plate differs from the other plates in having been taken more like an ordinary animated photograph. The movements of the bee are only slightly hurried up, giving her an appearance of almost feverish activity for a humble-bee.

The plate was taken in the garden in July; the wind presented a new difficulty, as the flower blew out of focus several times. The bees had been very busy on the Scabious flowers, so I took out my machine and focussed a flower, then put in the plate, and was fortunate to find a bee still at work. I took time exposures of her, one after the other, as quickly as I could turn the handle; the noise of the machine seemed rather to be attractive than otherwise. The unusual hum attracted two of her fellow-workers. We see one bee alight on the flower, and after a short time fly away again, and shortly afterwards a second bee comes. My original bee was very accommodating, and worked away steadily from floret to floret until 342 photographs had been taken, when she cleaned her hind legs and flew away.

This kind of photography is very laborious work. I have only about a dozen successful plates as the result of over three years' labour; but the intimate knowledge that one gains of the plants is in itself a great reward. I know those who have tried this kind of photography will at least sympathise with my difficulties and make allowances for the imperfection of the results.

I hope in the future someone may be found to take up the work on a larger scale. I shall be only too delighted to give any experimenters the benefit of my experience.

Description of Figures.

Fig. 4. Whole plate of *Fuchsia* containing 350 photographs, 12 inches in diameter (reduced).

Fig. 5. Twenty photographs enlarged from this plate selected from the series of 350, of which—

Nos. 1, 2, show a small bud on the left and an open flower.

Nos. 3, 4. The bud is swelling and is at the extreme limit of its pendulum swing. The stamens in the open flower of 4 have just burst.

Nos. 10, 11, 12, show the sepals of the bud separating.

Nos. 13, 14, 15. The style has grown out and the stamens are just beginning to appear.

No. 16. The older flower has lost a petal.

No. 17. A second petal has fallen.

Nos. 19, 20. The sepals and petals have fallen, and nothing is left but the young fruit.

No. 20 is No. 350 of the series.

Compare Nos. 1 and 20. The bud is now almost exactly in the condition of the open flower in No. 1.

List of Slides shown.

1. Opening and closing of the flower-buds in *Sparmannia africana*.
2. Movements of the stamens in *Sparmannia africana*.
3. Opening and closing of the leaves in *Mimosa sensitiva*, one of the sensitive plants.
4. *Maurandya* climbing by means of its leaf-stalks.
5. Opening of *Fuchsia* flower-buds and development of the fruit (illustrated in this Paper).
6. Opening of a *Sycamore* leaf-bud, showing the growth of the scale leaves.
7. Opening of the flower-buds of *Clivia*.
8. Fertilisation of the *Scabious* by means of humble-bees.

PHENOLOGY AS AN AID TO HORTICULTURE.

By EDWARD MAWLEY, F.R.Met.Soc., V.M.H.

[Lecture given on May 1, 1906.]

It may be advisable at the outset to explain the meaning of Phenology, for it is a word which many dictionaries do not contain. It is really the science of appearances. In other words, it deals with the first appearance each year of certain wild flowers, birds, insects, &c.

On the present occasion I shall only treat of plant Phenology, as it is the number of birds and insects in any year which concerns the gardener rather than the exact dates when they are first seen in any locality.

I propose, in the first instance, giving a short explanation of the system adopted by the Royal Meteorological Society, the leading organisation in this country dealing with the question of Phenology, and afterwards to offer a few suggestions as to how a modification of that system might with advantage be carried out in private gardens.

When I became Phenological Recorder to the Royal Meteorological Society in 1889, for the first two years I worked on the same lines as my predecessor, but found it impossible to derive any satisfactory conclusions from the tabulated results owing to there being altogether only twenty-three observing stations to represent all parts of the British Isles. For the large number of plants required to be observed made it extremely difficult to obtain sufficient observers able and willing to send in year after year the necessary returns. After due consideration I decided, with the approval of the Council, to reduce the number of plants from fifty to thirteen, selecting only those which were well known to most dwellers in the country, and allowing an average of about a fortnight between the mean dates of their blossoming, so as to cover the whole flowering season—beginning with the hazel and ending with the ivy. By this means I was able to secure the services of a large number of competent observers who are, in many cases, members of one or other of the Natural History Societies distributed over the country. The British Isles were divided into eleven large districts—such as the south-west of England, the south of England, the Midlands, the north and south of Ireland, and the west, east, and north of Scotland; in fact, the districts adopted by the Meteorological Office for the purposes of weather observation.

In order that the observations might be taken everywhere on one uniform plan, and so be as far as possible comparable, instructions are printed on the observation forms directing the observer to select his

plants in the first instance with great care, so that they may fairly represent the climate of the locality in which he resides. For this purpose he is instructed not to enter the date when any plant on the list opens its first flower in his own neighbourhood, but to choose for present and future observation particular specimens which were found to flower neither abnormally early nor abnormally late for that part of the country. A better plan would, no doubt, be to note the date of say half a dozen or more specimens of each of the plants on the list found growing in different parts of any locality, and to enter on the return the average date for these six or more specimens, as the representative date for that particular plant in any one season. But, of course, it would be almost impossible to find enough observers who would take the trouble year after year, or who would have sufficient leisure to make the necessary observations. Therefore the one-plant system has been adopted instead, and, provided the plants are in the first year selected with sufficient care, almost equally good results are in this way obtained. The instruction is to observe the same individual trees and shrubs each year, and, in the case of herbaceous plants, those growing in the same spots.

Even the best observations, however, are often found to vary considerably for different places in the same part of the country. This arises in a great measure from the variability of our climate, the weather being seldom more than a few days in succession in the same mood. For example, it may happen that at the end of a period of very warm weather the selected plant of one observer may have just come into flower, whereas the selected plant of another observer at that particular time may be only on the point of blooming when a change to colder weather takes place, and its flowering is to a greater or less extent delayed. To take an extreme instance, I may state that some years ago the winter aconite, in the part of my garden chosen for observing it, was about to open its first flowers, when there came a long spell of frost and snow, which prevented the blossoms from making any further development for some weeks. The consequence was that, instead of the date for that plant being the earliest I had ever recorded, it was among the very latest. However, with a sufficient number of observers in any large division of the country, like the Midlands, these irregularities are found to equalise themselves, as will be seen in Table B. Then, in order to show how important it is that the plants for observation be carefully selected, I may instance the wood anemone, some roots of which were planted in my garden under a fence facing west, others near the same place but a few yards distant from the fence, others on a piece of rockwork facing south, others under a deodara at the bottom of the rose garden, and the rest behind high shrubs about ten yards away from the deodara. Taking the last five years, their average dates of flowering have been respectively March 15, March 25, March 30, April 6, April 9, giving a range between the earliest and latest dates of twenty-five days.

The following particulars, the result of fifteen years' observation, may be of interest as showing the relative forwardness of vegetation in different parts of the British Isles—the mean date for the Midlands being taken as representing the average date for the United Kingdom as a whole :

TABLE A.

S. of Ireland	6 days early	N.W. of England	5 days late
S.W. of England	5 " "	N. of Ireland	6 " "
S. " "	4 " "	N.E. of England	9 " "
E. " "	2 " "	W. of Scotland	12 " "
		E. " "	14 " "
		N. " "	16 " "

So that according to the above table there is an average difference of twenty-two days between the flowering of the same plants in the earliest and latest of the above districts.

Then, as showing the difference made in the dates of flowering by an early and a late season, I may instance the average date of the blackthorn in the central or midland district of England, which in 1894 was March 27, and in 1895 April 27, while the hawthorn was first in blossom in 1893 on April 27, and in 1891 it did not flower till May 28, giving a range for each of these two shrubs of thirty-one days.

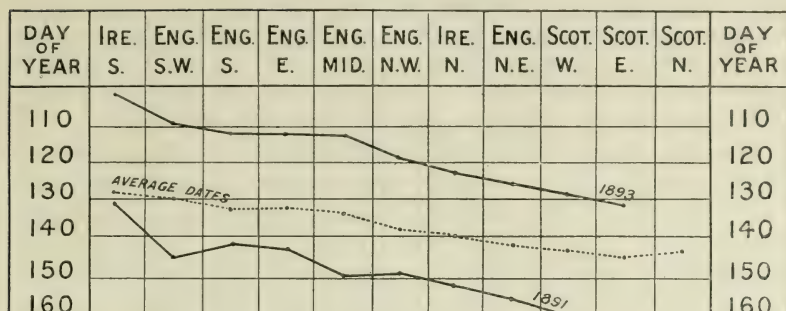
Table B gives the mean dates of first flowering of the thirteen plants and their variations from the average during the past fifteen years in all those districts where the Society has had throughout the whole period a sufficient number of observers. It will be seen that the most forward season was that of 1893, and the most backward that of 1891, while last year the dates were as nearly as possible average. It says much for the accuracy of the observers, and for the soundness of the system adopted, when we see year after year throughout this table such consistency in the results obtained.

Mean Results, with their Variations from the Fifteen Years' Average (1891-1905), for the Thirteen Plants in those Districts where there have been sufficient Observations to warrant Comparisons being made.

TABLE B.

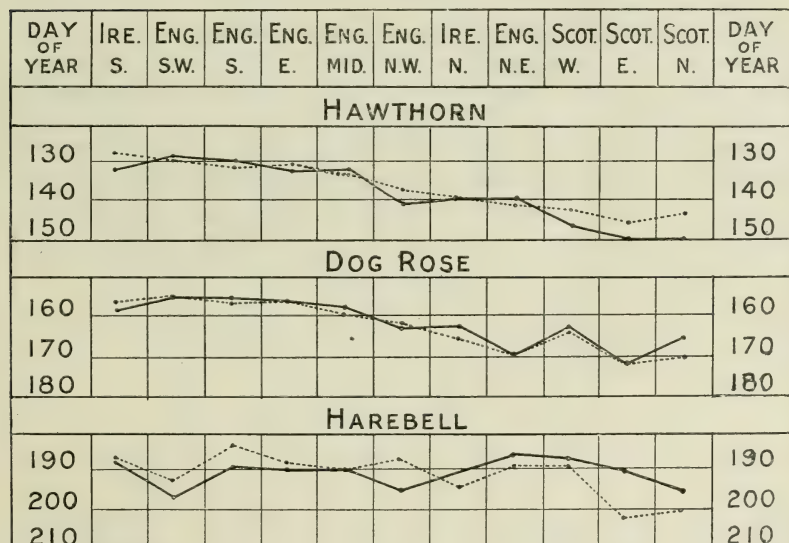
Years	England S.W.		England S.		England Mid.		England E.		England N.W.	
	Day of year	Variation from average	Day of year	Variation from average	Day of year	Variation from average	Day of year	Variation from average	Day of year	Variation from average
		Days		Days		Days		Days		Days
1891	144	+10	144	+9	150	+11	147	+10	150	+6
1892	139	+5	138	+3	144	+5	143	+6	147	+3
1893	118	-16	122	-13	125	-14	123	-14	128	-16
1894	126	-8	130	-5	135	-4	127	-10	137	-7
1895	139	+5	138	+3	141	+2	138	+1	144	0
1896	125	-9	128	-7	132	-7	130	-7	134	-10
1897	130	-4	132	-3	136	-3	132	-5	142	-2
1898	133	-1	135	0	138	-1	136	-1	141	-3
1899	136	+2	136	+1	141	+2	138	+1	145	+1
1900	142	+8	141	+6	144	+5	143	+6	152	+8
1901	138	+4	139	+4	141	+2	139	+2	144	0
1902	139	+5	140	+5	145	+6	142	+5	152	+8
1903	134	0	134	-1	137	-2	134	-3	145	+1
1904	139	+5	139	+4	142	+3	140	+3	149	+5
1905	133	-1	135	0	138	-1	136	-1	144	0
Mean	134	—	135	—	139	—	137	—	144	—

DIAGRAM C.



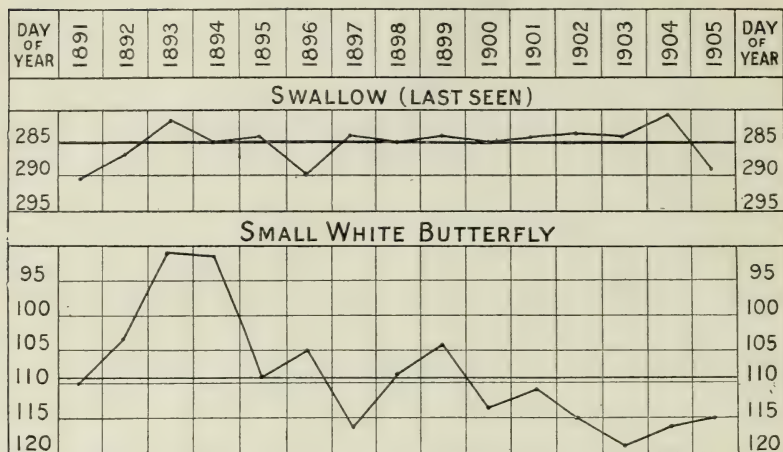
The above diagram shows the mean dates of flowering of the hawthorn in an exceptionally early season (1893), and also in an exceptionally late one (1891), and their departures from the fifteen years' average in each of the eleven districts.

DIAGRAM D.



Here are shown the mean dates of flowering of the hawthorn, dog-rose, and harebell last year (1905), with their departures from the average, as illustrating a year of seasonable flowering.

DIAGRAM E.



Although treating exclusively of plant phenology, it may be interesting to see how we deal with the arrival of birds and insects.

The foregoing remarks have had reference to the methods adopted in order to compare the dates of flowering of certain plants in different parts of the kingdom year after year. But for horticultural purposes in private gardens a much simpler plan need only be employed, as we shall then be dealing with what goes on in a single garden, without regard to anything that may take place in any other garden or in any other part of the country. I have for over thirty years taken observations of the weather with thermometers, raingauges, and other meteorological instruments, also throughout the same period I have noted the dates of first flowering of certain fruit trees &c. in my own garden, with the result that, although I consider both methods most useful to all keenly interested in their gardens, the weather observations, in my opinion, can be better dispensed with than the phenological ones. For the former only tell us what the weather is or has been, and unless the records are carefully tabulated and afterwards studied, as I am afraid they very seldom are, they can be really of little practical service. On the other hand, phenological observations give us, in a way we gardeners can better appreciate, the cumulative effects of heat, moisture, and sunshine upon all the plants in which we are interested. For what we really want to know is not so much the number of degrees of frost on any unseasonably cold night as the amount of injury it has inflicted on the more tender plants in the garden, and the retarding effect it has had upon those of a hardier nature. Besides which, when these observations and the notes on exceptional weather effects which should accompany them are afterwards carefully considered, the records will be found far more interesting, more easily understood, and the lessons they teach more readily grasped than any number of dry figures respecting temperature, rainfall, &c. But above everything the very fact of our having to keep these phenological records develops our powers of observation, so that almost unconsciously we get into the way of watching day by day those weather changes which have so powerful an influence either in furthering or marring our efforts. Every gardener, in a vague kind of way, has some idea as to the extremes of weather to which

the plants under his charge are subjected, but if he will only tabulate the phenological observations he has previously made in his notebook, he will be better able to realise what they really mean to him. To take the sowing of seeds, as one instance among many, how often are we tempted by a few bright summer-like days in early spring to begin seed-sowing, with the result that when the young plants come up they are either cut down by frost or make such tardy growth as to be at the mercy of any injurious insects which may appear among them when a return to warmer conditions again takes place. What meteorological and also phenological observations, and more particularly the latter, teach us, is the true character of our local climate and its numerous vagaries, without which knowledge we often only learn the same lessons after many bitter experiences.

Now for a few hints as to the best method to adopt in taking these phenological and other observations. All that is needed is that the observations should be made on one uniform plan, for which purpose the same fruit or other trees or shrubs of mature growth should be chosen for observation, and the dates when they are first in flower noted year after year. In the case of herbaceous or other plants, they need not be precisely the same specimens each year but should be growing in the same spot in the garden. A tree or plant is to be considered in flower when the stamens of the first blossoms on it are visible. In addition, entries should be made in the observer's notebook of the effect of any exceptional weather on the vegetables, fruit trees, &c., in the kitchen garden as well as on the shrubs, flowers, &c., in the other parts of the garden.

The following are the principal results of the phenological and other allied observations made in my own garden at Berkhamsted during the last twenty years, and may serve as a guide to intending observers. Judging from my own experience and from what I have gathered from other members of the Phenological Staff of the Royal Meteorological Society, they cannot fail to derive much pleasure and instruction from taking regularly the necessary observations, and as years go on will find it an increasingly fascinating pursuit.

Dates of Flowering &c. of certain Plants at Rosebank, Berkhamsted,
during the years 1885-1906.

TABLE F.

	No. of years observed	Mean date	Earliest date	Latest date	Range
					Days
Winter Aconite	20	Jan. 19	Jan. 5	Feb. 22	48
Double Snowdrop	20	Feb. 8	Jan. 21	Feb. 26	36
Yellow Crocus	20	Feb. 23	Feb. 3	March 17	42
Chionodoxa Lucillæ	20	March 7	Feb. 14	March 29	43
Early Rivers Peach	21	March 23	March 4	April 20	47
Wild Cherry	21	April 19	March 30	May 7	38
Blenheim Orange Apple	20	May 6	April 12	May 20	38
Lilac	20	May 11	April 20	May 27	37
Rosa alpina	20	June 2	May 5	June 16	42
Wild Dog-rose	20	June 5	May 10	June 17	38
Dahlias killed	21	Nov. 5	October 4	Dec. 1	58
Last Rose bloom	21	Dec. 12	Nov. 3	Jan. 17	75

SOME PHASES OF TWENTIETH-CENTURY HORTICULTURE
IN THE UNITED STATES.

By Professor CORBETT (of Washington City).

[Lecture given on May 15, 1906.]

FOR one who has, so to speak, grown up with and become a part of the horticultural development of a country possessing such varied conditions of soil and climate as the United States to attempt to give a retrospective view of the horticultural conditions of the country is perhaps more difficult than for one who has not been so intimately in touch with the work. The horticultural conditions of the country, barring the great fruit developments, have assumed immense commercial proportions which in character are very different from the conditions which existed a decade ago. This has been brought about by the economic and climatic conditions which exist in the United States. The economic factors which have taken an active part in these changes have been the phenomenal growth of the great centres of consumption—that is, the great cities of the United States—and the extension and perfection of the railways. One other factor which has played an important part in this change is the wide diversity of climatic conditions which exist from Maine to Florida along the Atlantic coast. During the early part of the development of any city its few supplies are, as a rule, drawn from a comparatively limited radius; but as population increases the available territory within a limited radius becomes inadequate to meet the demands of the varied tastes of the people as well as inadequate to furnish a sufficient supply. The demand of the cities for fresh vegetables and flowers throughout the year has been an important, if not the most important, factor in developing two or three commercial branches of horticulture.

In the first place, the great industries which have grown up in the neighbourhood of New York, Boston, and Chicago for the purpose of growing vegetables, such as lettuces, radishes, tomatoes, and cucumbers, out of season, as well as the immense areas of glass now devoted to the production of roses and carnations, are developments due to, and dependent upon, the great city populations. For many years the expense attendant upon the production of vegetables, such as lettuces, tomatoes, cauliflowers, and cucumbers, under glass confined the consumption of such crops to those whose annual income was sufficient to allow them to gratify their tastes for luxuries. With the extension and perfection of the railway facilities of the United States other territories became, as it were, within the radius of the natural area for supplying the great centres of consumption. Districts 1,500 or 2,000 miles away can now be reached by these arteries of commerce; consequently such crops as were formerly grown almost exclusively in forcing-houses can now be obtained at a much less cost from more favourable latitudes, so that a great change has taken place in this particular branch of horticulture. The market garden,

which was the natural and legitimate source of supply for a few months in each year for the local market, has become a field industry for supplying distant places; climate has replaced fuel; transportation facilities have brought the market nearer the producer; with the result that, instead of vegetables of the class above mentioned being luxuries for those whose income was above the average, winter vegetables have become a common article in every shop and market place in America. They are no longer luxuries, they are regarded as necessities, and the price is within the reach of the artisan. This is perhaps one of the most important and one of the most remarkable changes which have taken place in American horticultural conditions in the last decade; for it is not more than this period since transportation facilities have been so perfected as to enable truck growers to engage in this business in a large way. At the present time the trucking business along the Atlantic seaboard, from the southernmost part of Florida to the northern limits of our coast line, has become differentiated into well-developed and well-marked trucking zones. Each zone or section can command the northern markets for a definite period of time each year. The crops grown are either general market-garden crops, which are adapted to transportation, or they are special crops. Some growers confine their efforts to tomatoes, others to potatoes, others to cucumbers, others to lettuces, while others engaging in the business in a very extensive way carry a full line or list of the standard crops. In this way the production of vegetables for the supply of the American markets has come to be a work of growing special rather than general crops. A man may be a specialist in cucumbers, potatoes, roses, or carnations without knowing very much of anything regarding the production of other crops. This is true also of the great agricultural developments of the country. Certain regions become noted for the production of a single crop. It goes without explanation that industries of this character are rather dangerous to the economic welfare of the country as a whole. A greater diversity in the character of the crops grown in any particular region places the region upon a much safer basis than when the welfare of the people is dependent entirely upon a single crop. This is one of the dangers towards which the rapid development of American horticulture is carrying us. The fact that large returns are frequently secured from growing extensive acreages of a single crop has induced people to become somewhat reckless in the planning of their work. They have come to rely upon a single crop and believe it to be the only factor worthy of consideration in their business. This danger, which has been brought to our notice so forcibly in the great wheat belts and is now being so emphatically brought home to the residents of the cotton belt of the United States, is certain to come sooner or later to the horticultural regions which have developed upon the single-crop idea such as that above described. It is evident, however, that long-distance trucking or market gardening must necessarily be very much specialised and restricted in order to make it profitable. Many crops which find sale in the markets naturally sell at so small a margin of profit that a slight fluctuation in price is sufficient to throw the grower at a long distance from the market heavily into debt when large consignments are made. If the market falls so as to cause a product to be sold at or

below the cost of production and transportation the shipper must bear the loss. This places the long-distance gardener in a very precarious position. At certain periods in the year, when the market first becomes available to him, prices are, as a rule, remunerative; but as the fields of production become nearer and nearer to the centres of consumption, through the change of the seasons, it is evident that the grower most distant from the market will be at a disadvantage in comparison with the producer who has a shorter distance to bring his products. It therefore requires a very keen insight into the demands of the market as well as a varied knowledge of the limitations of the seasons in any given locality in order to determine with a fair degree of accuracy the variety and amount of any crop to grow. The time for planting and harvesting a particular crop in any given locality must be thoroughly understood.

Along floricultural lines tastes are changing, though somewhat slowly. The rose, the carnation, and the chrysanthemum hold the popular attention. Roses and carnations are considered necessary accessories to all social functions, and are standard decorative flowers throughout the whole year. Violets perhaps stand third in the list of commercial plants in the American trade list; while the chrysanthemum, during its reign from September to December, is supreme. Commercial florists grow them by the thousands, amateurs give special attention to the production of single-stem blooms or to pot plants bearing as many as 100 or more blooms, and some who are especially ambitious resort to inarching for the purpose of producing upon a single root as many as twenty-five or fifty or more varieties. The chrysanthemum shows or exhibitions which take place annually in every large city, and which have grown up in the last twelve or fifteen years, serve as an index of the popularity and importance, both from a commercial and amateur's standpoint, of this remarkable flower.

One of the important agencies which cannot be passed without comment, which is now at work in this country, the influence of which will be felt in later generations, is the movement now taking place throughout the educational world to bring the so-called "nature study" or school-garden work into, and making it a feature of, the instructional work of the common and graded schools. Every child who has attained the age of seven is brought in direct contact with natural objects and is unconsciously taught the wonders and beauty of life as exemplified in the green grass, the unfolding bud, and the expanded leaf. This work of popular education has not yet become fully developed—in fact it is not fully under way. It has made a start and is rapidly growing in popularity; each year records a decided increase in the amount of attention given to this particular phase of the æsthetic as well as of the scientific education of the little people. The results of the seeds which are now being sown in the fertile soil of the juvenile minds of America can only be measured when they shall develop fruit in the decoration of the homes, the embellishment of the parks and gardens, and the extension of public improvements of future generations. Those who have given this subject most thought and attention, and who are most deeply interested in it, feel that time alone will show the fruits of this labour.

Another important factor which has been recently developed in America,

and which has been borrowed from the mother country, is the increased number of popular and high-class farm journals bringing before the American readers the possibilities which exist in country life. The congested condition which has resulted from the rapid increase in population in the great cities, together with the tremendous advance in the price of urban property, has forced people of small means to look beyond the confines of the city for suitable residential places. Many of these people were reared in the free atmosphere of the country, and after they have acquired a sufficient amount of the world's goods to enable them to stop and reflect, their attention is directed by these publications to the conditions of their childhood. Bright sunshine, pure air, and broad fields have become more attractive to them than congested avenues and streets. The result is that at present there is a decided tendency to give attention to the restoration of country life in its broad sense. Movements which are on foot and improvements which have been made in steam and electric transportation now enable men of business, whose presence for six or eight hours of each day must be in one of the great commercial centres, to maintain their residence ten, fifteen, twenty-five, or even fifty miles from the scene of their daily occupation. The improvement of the roads, which is now being discussed in many cities, and which is actually being put into practice in many others, will enable the horseless carriage to convey persons ten, twelve, or fifteen miles each day to and from their places of business. The extension of steam and electric railways in every direction from the cities has for several years been working to carry the city to the country. These movements all have a marked bearing upon horticultural conditions. The possession of acres instead of square feet of land about the house naturally attracts one's attention to decorative, fruit-bearing, and garden plants. Every suburban residence lot consisting of a half-acre or more of land has upon it a considerable variety of trees and shrubs intended for decorative as well as commercial purposes. The ornamental generally precedes the utilitarian. The embellishment of the grounds by the making of lawns, planting of trees and shrubs, is, as a rule, the first work of the landholder. The fruit garden and the vegetable garden come later if at all. This movement has created a demand for simple and inexpensive methods of rendering house surroundings attractive. The demand for such material is felt, and is being provided for by such agencies as the U.S. Department of Agriculture, various State experiment stations and colleges, and perhaps most of all by the commercial nurserymen. As might be expected, the use of indigenous plants has been the keynote to the success, if it may be called such, of this movement. Those who have been factors in directing the training of the public mind in matters relating to the decoration of home grounds have been wise in calling attention to what nature has provided in each locality for meeting these problems. Nurserymen have felt the impress of this work, and are now giving more attention than formerly to the production of indigenous shade and ornamental trees, as well as to the native shrubs and herbaceous plants.

This popular return to more natural conditions has even extended itself to the charitable work of the great cities, notably in Philadelphia, Washington, and others. The character of this work is somewhat unique, and may

be worthy of a moment's consideration. Instead of placing money at the disposal of deserving people who are unable to provide sufficiently for their wants during the regular working hours at the bench or in the store, there has sprung up in the cities mentioned a popular movement which has as its object to place at the disposal of such deserving people as are willing to take advantage of an opportunity to improve their home conditions, small plots of land which are ploughed, harrowed, and enriched, upon which they can grow vegetables with which to supply their own tables. This is based upon the principle that the best way to assist a man is to help him help himself. By this means people who are too proud to ask aid from the regular charity organisations are reached without being humiliated. People who need physical exercise in the open air are assisted and benefited. The self-respect for those who are engaged in the work of producing the necessities of life is impressed on those who, as a rule, are most prone to ridicule it. The work in every instance has proved of very decided commercial value to those engaging in it, in the way of adding to their income by furnishing a part of the supply for the household. It has this other great advantage, that the products coming from these areas are fresh, wholesome, and palatable, and this carries with it a new appreciation for garden products which is only realised by those in the condition of the persons usually reached by such a movement. Instead of the table being supplied with stale fragments which can be purchased at small cost in the market place, they are supplied with fresh, wholesome, crisp products direct from the garden, which in itself is sufficient to place the recipients upon a better physical basis, even if it did not stimulate an interest in rural pursuits; but in many instances persons who have been aided in this way, and whose attention was first directed to the possibilities of gardening through the agency of the charity workers, have become enthusiastic and successful commercial gardeners. Many months, and even years, have been added to the lives of numerous individuals by keeping them outdoors and by directing their efforts into new channels. Persons who if they had to continue work at the bench or counter for any considerable period would have entirely lost their health have been restored and invigorated by change of occupation from indoor to outdoor life.

Such movements, I realise, are not exactly in line with what might be expected to be mentioned in a horticultural lecture. They are not the records of the changes which have taken place in the popular demand for varieties of roses, chrysanthemums, radishes, or gooseberries. They are, however, a record of some of the great movements which are taking place in the United States at the present time, which will in the future and which are at the present time making a decided effect upon the horticultural tendency of the country. Popular education along rural lines is having a wonderful effect in this country. The mass of information which has been collected and made available through the work of the experiment stations and colleges of America is now being co-ordinated and applied to the economic conditions of those whose financial welfare depends upon the cultivation of the soil. This work is, I realise, a work of education. It is much easier now than it was ten years ago, because the agencies which have been working through the above-named

institutions have developed well-defined principles and modes of action, and it only remains now to interpret the principles into popular language and carry them to the people to whom they can be of greatest use. The work of the experiment stations is by no means complete, for there are as many unsettled problems as those which have been settled. The great fundamental truths, however, are pretty well understood and are susceptible of being put to economic use. The work which is being done by the agricultural and horticultural Press of the United States is perhaps even greater than the work of the educational institutions. The results which are now being achieved by the popular Press by bringing the results of experiments to the practical cultivator would not be possible except for the work already done by our schools and experiment stations. The agricultural schools reach less than one person in five hundred connected with rural pursuits, and experiment-station publications reach, perhaps, a somewhat greater proportion ; but the rural Press, regular in its publication and bearing testimony to the practical results of the work of the experiment stations, becomes, as it were, the great organ for demonstration work of a practical nature.

TEA AND THE TEA PLANT.

By Sir GEORGE WATT, C.I.E., M.B.C.M., LL.D., F.L.S., &c.

[Lecture given on June 8, 1906.]

THE first European who makes mention of tea would appear to be Maffeus, an Italian who wrote a history of India, originally published 1588 (see ed. 1751, p. 119). That most valuable work was compiled from the information of the Jesuit Fathers resident in China and India. It has been well ascertained that in England tea drinking had only begun to attract attention nearly 100 years later, namely, in 1660. In fact 250 years ago tea was practically unknown to the inhabitants of Europe. It was first brought to this country from China through the Dutch merchants. But in 1664 the East India Company made a present of some tea to King Charles II., and about that time it sold in London at from £5 to £10 sterling a pound. In 1689 a direct duty was imposed on the imports, which amounted to 5s. a pound. One hundred years later we read of the King's duty on tea, between September 1784 and March 1797 (a period of, say, thirteen years), having realised £4,832,189, so that a distinct demand for the article must have been established notwithstanding its high price.

In 1703 the imports into Great Britain came to 100,000 lb., and in 1721 they had attained to the proportion of 1,000,000 lb. From 1722 to 1744 the duty was fixed at 4s. a lb. excise, with, in addition, a Customs due of 14 per cent. on the average price. Macpherson ("Annals of Commerce," 1805) tells us that the high duty on tea led to its being adopted as one of the most convenient articles for illicit trade. An Act of George I. (1721) prohibited British subjects from resorting to or trading with the East Indies under foreign commissions. An Act of George III. (1777) in order to prevent frauds on the revenue notified: "All persons making counterfeit tea of leaves of sloe, liquorish, ash, elder, &c., or of tea that has been used, are subjected to a fine of five pounds for every pound of weight of such leaves sold by them or found in their possession." In 1784 it was estimated that only about one-third of the tea sold in Great Britain actually paid duty. This difficulty was finally met by the reduction of the taxation until the limit of possible profit in illicit transaction had been passed; ever since tea has been one of the purest articles of human food. From 1784 to 1795 the duty was thus gradually reduced until it stood at a total of $12\frac{1}{2}$ per cent. Unfortunately in 1795 the system of raising money by taxing tea was again resorted to and gradually augmented until, in 1819, tea sustained a duty of 100 per cent. In consequence the demand remained stationary at approximately 21,000,000 lb. a year.

By an Act of Parliament the East India Company's monopoly was abolished; the unrestricted trade which ensued stimulated competition, and hence reduced the price very greatly. This of necessity facilitated

consumption. At the same time, the Government having got over their financial difficulties, the duty was reduced until it stood at 1s. 6d. to 3s. a pound, according to quality. In 1856 the duty became 1s., and in 1867 it finally became 6d. a pound.

For our present purpose it is not necessary to go into further statistical details. The particulars mentioned justify the opinion that, 200 years ago, tea in England could not have been much more than a luxury of the very wealthy; that it did not become a necessity of life with the middle classes of the community more than fifty years ago, and that only to-day has it found admission to the homes of the poor. It is thus essentially a modern article of European diet, and, moreover, one which has gained a position of greater importance in England (and with the English colonies) than in any other part of Europe. The consumption of tea per head of population worked out on the census of 1900 was as follows:—Western Australia, 10·07 lb.; South Australia, 8·87 lb.; United Kingdom, 8·44 lb.; New South Wales, 8·01 lb.; Victoria, 7·38 lb.; Queensland, 7·09 lb.; New Zealand, 6·78 lb.; Tasmania, 6·62 lb.; Canada, 4·29 lb.; Holland, 1·48 lb.; United States, 1·14 lb.; Russia, 0·93 lb.; Germany, 0·13 lb.; and France 0·05 lb.

Discovery of the Tea Plant in India.—The first mention of tea in connection with India occurs in the “Journal of Albert de Mandelslo” (1659, p. 42) in which he says the habit of tea drinking was general both with the Natives and Europeans. A similar statement occurs in Ovington’s “Voyage to Surat” (1689, pp. 305-9). The Dutch East India Company, we also read, were in the habit of transshipping the tea they brought from China at Madras and Surat preparatory to its being sent to Europe. The habit of tea drinking may in consequence have been acquired in the coast towns of India to a small extent, but it is not general even to-day.

Curiously enough, one of the earliest and at the same time most instructive botanical specimens of the tea plant extant is in the Sloane Herbarium of the British Museum. It will be found in vol. lxxxi. p. 48, and belongs to a series of specimens said to have been collected in Malabar, between 1698 and 1702, by Samuel Browne and Edward Bulkley. Browne was a surgeon in the service of the East India Company and died some time prior to 1703. He was succeeded by Bulkley. Both of these officers made extensive botanical collections which were sent for the most part to James Petiver. It is thus just possible that long prior to the discovery of the indigenous tea plant in India or to the importations from China of seeds and plants accomplished by Gordon and Fortune (presently to be described) the tea plant had actually been conveyed to India and cultivated experimentally somewhere on the Malabar coast. But what is most curious of all is, that the plant so grown was not *Camellia thea*, Link, var. *Bohea* (the plant presently being cultivated most frequently in the plantations of South India), but var. *viridis*, and was thus very similar to the so-called “Assam Indigenous.” It is, moreover, just possible that upon this very specimen was based the name *Thea viridis*, as given by Hill and adopted subsequently by Linnæus. In fact Linnæus possessed only one leaf of the plant, so that the type of the species has to be accepted as given by Hill (“Exot. Bot.” 1759, ff. 21, 22).

Difficulties having arisen, about the beginning of the nineteenth century, with China, the British Government appears to have realised the danger of having no source of tea—even then becoming a necessity of life—than the Chinese supply. Animated discussions were, moreover, at that time taking place in England, which ultimately culminated in the overthrow of the East India Company's monopoly in tea. The British Government accordingly encouraged the Company to endeavour to establish tea plantations in India. In consequence tea seeds were procured from Canton in 1780, and planted by Colonel Kyd in a small garden near Calcutta which ultimately became the Royal Botanic Gardens. Kyd wrote to Sir Joseph Banks to secure his co-operation, and Sir Joseph, in 1788—as Director of the Royal Botanic Gardens, Kew—recommended Warren Hastings to seriously attempt the cultivation of tea in Behar, Rungpur, or Kuch Behar. Interest was thus aroused in the subject, and somewhere between 1819 and 1824 Major Bruce and also Mr. David Scott, the first Commissioner of Assam, discovered wild tea in that province. This interested Dr. Buchanan Hamilton very greatly, but so little attention was paid to the matter officially that the correspondence does not appear to have been preserved, and it cannot now be definitely ascertained which of these two discoverers should have the honour of priority. I have not been able to trace a botanical specimen, preserved in any herbarium, that could be identified as the Bruce-Scott plant. There seems to be no room for doubt, therefore, that specimens were sent to Mr. Kyd (son of Colonel Kyd) for the purpose of being compared with his Chinese plants, and that these corresponded with the Assam indigenous plant as known to us at the present day.

Before Lord William Bentinck left England to assume the duties of Governor-General of India, he was interviewed on the subject of his giving the question of tea cultivation his warm support. He lost no time in complying, and appointed a committee with Dr. N. Wallich (by that time Superintendent of the Royal Botanic Gardens, Calcutta, as its secretary) to report on the measures necessary, and the most hopeful localities for experimental cultivation. A resolution of the Government of India dated January 24, 1834, embodies the conclusions that had been arrived at. This was given to the English public in the form of a parliamentary paper, and is thus the first official notification of the now famous Indian tea industry.

Mr. G. J. Gordon, of the firm of Messrs. Mackintosh & Co., of Calcutta, had been despatched to China to procure seed, to collect information, and to bring to India expert Chinese tea cultivators. In 1834 plants raised at the Botanic Gardens, Calcutta, from seed procured by Gordon were ready for transplantation, and were handed over to Falconer to be personally conveyed to Kumaon. In 1835 a small plantation was, however, also started at Luckimpore, in Assam.

Shortly after Gordon's departure for China, Jenkins, and subsequently Charlton, rediscovered the tea plant in Assam. This led to an acrimonious controversy. Wallich refused to believe that it was the true tea plant, and accordingly Jenkins had a sample of tea made from the wild plant and sent that to Calcutta in support of his discovery. He does not mention how it was that he came to be able to prepare tea, but Mr. Bruce a little later, "Account of the Manufacture of Black Tea in Assam" (1838), says "the Singhfos have known and drunk tea for many years." To their ancestors very possibly may have been due the introduction of the plant into the valley of Assam. The fact of tea being actually made, from a presumed indigenous stock, seems to have proved a convincing argument that the tea plant did actually exist in Assam. Gordon was recalled from

China, and a commission was appointed in 1836 to visit Assam and report to Government.

Once more the botanical authorities could not, however, agree. Griffith recommended Assam as the best locality for the proposed plantation, but Wallich advocated that the Himalaya should be first tried, then Assam, and lastly the mountains of South India. Further he urged that "the China plant and not the degraded Assam plant" should be experimented with. The controversy about black tea and green tea and of the separate plants from which these were supposed to be made—a problem that had perplexed many writers—was doubtless once more the will-o'-the-wisp that largely influenced Wallich to assert that the Indian plant was a *Camellia* and not a *Thea*. In guarded yet unmistakable language Griffith told his opinions, even though these were inimical to the views of his superior and colleague. His report—the "Tea Plant of Upper Assam" (1836)—deals with the subject in a masterly fashion, and will richly repay perusal. Griffith collected the wild tea of Assam, and his specimens are preserved in Kew. They differ in no respect from the so-called indigenous tea of the modern plantations, so that there is every reason for believing that both Bruce and Scott had actually discovered the true tea plant in Assam.

Wallich, Royle, and Falconer upheld the Himalayan theory and the China plant; Griffith and McClelland urged the claims of Assam and the Assam plant. Wallich prevailed, and Gordon was in consequence redeputed to China, and on his return to India with a large supply of plants, seeds, &c., he resigned his position on the Commission without ever having written a report of his Chinese explorations. It is not known how much money the Government of India spent from first to last in their tea experiments, but it is recorded that Gordon's deputation to China on two occasions and the expenditure connected with the Indian Tea Commission cost £18,000. The first sample of Indian-grown tea was sent to England in 1838.

A third mission to China (the expense of which was partly borne by the Royal Horticultural Society of England) was organised and successfully conducted by Mr. Robert Fortune, who wrote in consequence "Three Years' Wanderings in China" (1847), "The Tea Districts of China" (1853), and "A Residence among the Chinese" (1857). These works contain full particulars of his studies of the Chinese industry, as also details regarding the plants, seed, &c., conveyed by him to India. The industry was in consequence securely established and gigantic advances crowded rapidly on each other. Plantations were opened out in Kumaon, Dehra Dun, Kungra, Assam, the Nilghiri Hills, and elsewhere. The systems of growing and manufacturing were greatly improved, and machinery began to be invented to do all that hand labour accomplished in China, and both more satisfactorily as well as more economically.

Mr. C. A. Bruce was in 1836 appointed Superintendent of the Government Tea Plantations in Assam, and in thirty years' time such progress had been made that the Government were able to retire. It had been freely announced that when the industry no longer required the fostering care of the Government, it would be handed over to private enterprise. Griffith's views of Assam and the Assam plant had thus been confirmed.

In consequence the progress in Assam was such that long before the Government could dispose of their Himalayan plantations they had been able to retire from Assam.

The other day, while examining certain papers on tea, preserved in the India Office, I came across what purports to have been an advertisement of the first regular commercial sale of tea made by Government. It is signed by Mr. Thos. Watkins, Superintendent of the Government Plantation (the successor to Mr. Bruce doubtless), and was endorsed by N. Wallich, M.D., Superintendent the Honourable Company's Botanic Gardens. It is dated Jaipur, Upper Assam, March 5, 1841, and is headed, "A Novel and Interesting Sale of Assam Teas : The First Importation into the Calcutta Market."

I think it may be of interest to reproduce this curious document, and thus preserve it in the JOURNAL R.H.S. for many years to come. It will be observed that it announces two parcels of tea for sale, viz. thirty-five chests manufactured by the Singhfo chief Ningroolla and ninety-five chests the produce of Government tea plantation in Assam for the season 1840. It will thus be observed that the Singhfos were actually manufacturing tea in Assam at the very time strenuous efforts were being made to engraft on that province what was very shortly before the publication of the advertisement deemed a new industry. And it is certainly worthy of note that Dr. Wallich should have had to countersign the first commercial announcement of the sales of Assam-grown tea long prior to the appearance of similarly large parcels from the Himalaya.

The Government plantations in Assam appear to have been sold in 1840, and the Jaipur garden in Sibsagar became shortly thereafter the nucleus of the Assam Company—the first public tea concern, and to this day very much the largest company in India. But for some fifteen years it could not be regarded as being very prosperous. In 1852, however, it turned the corner, and with its prosperity speculators rushed eagerly into Indian tea. Plantations were opened out in Cachar, Darjeeling, Chittagong, Chutia Nagpur, and the Duars with a rapidity that could hardly help culminating in the disaster that overtook the industry in 1865–67. This was, briefly, a consequence of reckless impetuosity, ignorant supervision (both at the plantations and the agencies), and in some cases positive dishonesty. Fortunes were made by the few who realised that the tide would turn, and accordingly purchased the better situated gardens that came into the market, often for fewer rupees than they had cost pounds sterling to construct. Out of these trying times the industry rose on a firmer foundation, and its subsequent prosperity is one of the marvels of Indian commerce and British enterprise.

In about seventy years' time much had been thus accomplished. Tea now occupies half a million acres of land that were formerly waste and non-productive, and of that area 64 per cent. is in the province of Assam and Eastern Bengal. The industry gives lucrative employment to over 600,000 persons. The invested capital comes to well over £20,000,000. The first exports were in 1838, and amounted to 488 lb.; but in 1904, or sixty-six years later, they came to 200,000,000 lb., valued at £6,000,000. As an offshoot of the Indian industry, Ceylon was saved from absolute bankruptcy by the substitution of tea for coffee, which, with Indian experience and stock, could be accomplished at once. Lastly, India and

speaks of the best tea growing in the middle of the trees, exposed to the sun. "The tea whose leaves are long and large is the best, and that which hath small, short leaves is not esteemed good; that which hath its leaves curled is the most valuable, and that which hath them quite smooth is the worst." Here we have the practical man discussing the large and the small leaved forms of the plant for which the botanists a little later invented the names *viridis* and *Bohea*.

Lettsom and Hayne figured and described the forms of the Chinese tea plant so accurately and fully, that it is difficult to understand how any misconception should have prevailed when, some years later, the finest Chinese tea plant was found to be indigenous to Assam.

History has but repeated itself, however, for had the Indian botanical experts of the early decades of the nineteenth century carefully considered this subject they would have saved not only themselves but the planters endless trouble and expense, and would in consequence have refused to allow the attempt to be made to organise an Indian tea industry exclusively with the small thick and smooth-leaved plant that had alone, apparently, been procured from China. And when their attention had been drawn to the Assam plant they should have instantly recognised that it was the superior stock of China (figured by Lettsom, Hayne, and others), instead of having indulged (as did Wallich) in an academic controversy as to its being a *Camellia*, but not the true *Thea* of Linnæus.

Thus we are confronted with an old and well-authenticated fact, that comes to us almost like a new discovery, because hitherto it has been so completely overlooked, namely, that in China the finest tea plants are scarcely, if at all, different from the finest Assam races.

Hence it follows that when the Indian Government spent large sums in procuring seed of the tea plant, a clever trick may have been successfully played off, namely, of sending to India only the very most inferior seed. If this surmise be correct it is highly likely that, but for the happy discovery in India itself of a superior indigenous plant, the establishment of the Indian tea industry might, by the practical joke suggested, have been retarded by many years. At all events most Indian planters regard the introduction of the Chinese small-leaved plant as having been a calamity which took them years of heavy expenditure to efface. But it is of no serious consequence whether the cultivated tea plants be viewed as comprising many species (from the botanist's standpoint) or only many sports or even climatic races. If the forms indicated yield different qualities of tea, if they can be grown under certain soil and climatic conditions and not under others, if they require shade or seek full exposure to the sun, these and such like peculiarities are of supreme value to the planter. Everything that has been written of tea, from the very earliest time down to the present day, points to the study of the plant being of the utmost value, and moreover it is a subject that has been disgracefully neglected. Only the other day I laid an assortment of specimens of these plants before a botanist of eminence, and observed that they manifested one of the most remarkable examples of adaptation to cultivation in existence. He replied, "Are you, however, correct in calling them all forms of one species? I should think there are several species in the series." This shows that even to the casual observer there are differences, and to the planter these differences in my opinion denote aspects of interest that have been far too much neglected. The difficulty is, however, to find words to express the differences that would be intelligible to the planter.

From what has already been said it may have been inferred that we have to accept the botanical view, namely, that there is but one species of tea-yielding *Camellia*, with under that at least several well-marked varieties, spoken of generally as only cultivated races. These correspond with the *Thea viridis* and *T. Bohea* of the early botanical authors, with in addition the *T. stricta* and *T. lasiocalyx* of more recent writers.

Species and Varieties of the Tea Plant.—Linnaeus ("Gen. Pl." 1st ed., 1737) indicated the genera *THEA* and *CAMELLIA*. The differences between these turned on whether or not the stamens were free from each other or united, as also on the number of cells and seeds in the fruit. He placed *THEA* into *Polyandria monogynia*, and *CAMELLIA* into *Mono-delphia polyandria*. Subsequently Linnaeus mentioned the tea plant as characteristic of his genus *THEA*, and the Japanese flowering *Camellia* as the type of his *CAMELLIA*. But it has since been abundantly confirmed that Linnaeus was in error when he regarded the stamens as free from each other in the tea plant, and it is a matter of everyday knowledge that the fruits found on one and the same individual may have one, two, three, or more seeds. Modern botanists are accordingly of opinion that the two genera cannot be upheld, and the only difference of opinion seems to be regarding which name should be retained. Priority of accurate knowledge of the structure of the genus undoubtedly favours *Camellia*.

Turning now to the specific name: In the first edition of the "*Species Plantarum*" Linnaeus (without giving any description) called the tea plant *Thea sinensis*, and remarked that he had seen some specimens with six petals and others with nine, but he left it to those who had the opportunity of studying the living plants to say whether that peculiarity denoted two or only one species. In the second edition of his work (published in 1762) he discarded the name *T. sinensis* without giving any reason, and accepted the conclusion arrived at by Hill (1759), viz. that there were two forms—*Bohea Tea*, a plant with small dark green leaves and six petals, and *Green Tea*, a plant with long pale green leaves and nine petals. Linnaeus makes no mention of Hill's further suggestion that the former yielded black tea and the latter green tea; he simply rendered the names as *Thea Bohea* and *T. viridis*. Thus nearly a hundred and thirty years after Bontius had emphatically said that the difference between the black and the green tea was in the preparation, not in the plant used, we find Hill and several subsequent authors affirming or suggesting that the green and black teas were the produce of different plants. At all events they stoutly upheld the existence of two distinct species of cultivated tea plants. In the Linnaean herbarium there are the following specimens and notes: "*Thea Bohea*, n. 152," an excellent sheet, also two separate leaves named *T. viridis*, with the name "Gordon" written below each. One of these is a leaf of *T. Bohea* from Canton, the other a small form of *T. viridis*, said to be *T. Hyson*. The Gordon who corresponded with Linnaeus was a nurseryman of Mile End, London, who died in 1780. He thus may have been growing the plants of which he sent the leaves to Linnaeus—and very possibly for the purpose of determination.

We are thus led to the following assortment:

Camellia Thea. Link ("Enumer. Pl. Hort. Berolinensis," 1822. ii. p. 73). Link was the first botanical writer who definitely placed the tea plant under *Camellia* and he retained two forms, *C. Thea* and *C. viridis*. (See Fig. 7.)

While touring through the Indian tea districts in 1894 I was asked for ready eye-marks by which the cultivated forms could be distinguished. I replied by

giving something like the following distinctions, which I here amplify, to denote the varieties and races of the plant as accepted by me :



Thea stricta.

Thea viridis.

FIG. 7.—ILLUSTRATIONS PUBLISHED IN 1821 TAKEN FROM HAYNE'S "GEWÄCHSE."

VAR. *a* VIRIDIS: *Thea viridis*, Linn., *Sp. Pl.*, 1762, p. 735; Hill, *Exot. Bot.*, 1759, t. 22: *Green Tea*, Lettsom, *Nat. Hist. of Tea Tree*, 1799, pl. 1; *Thea viridis*, Hayne, *Gewächse*, 1821, vii. pl. 29 (photographically reproduced here in fig. 7); Booth, *Trans. Hort. Soc. London*, 1830, vii. p. 558; Bot.



FIG. 8. - CAMELLIA THEA, LINK, VAR. VIRIDIS.
Nearly half natural size.

Mag., 1832, vi. t. 3148; *Thea chinensis*, Linn., by Seem., *Trans. Linn. Soc.*, xxi. 1859, 337-52, t. 61; *T. assamica*, Masters, *Jour. Agri. Hort. Soc. Ind.*, iii. (1844), 63; *Assam Tea*, Wall., *Jour. Asiat. Soc. Beng.*, iv. 48, t. 2. *The Assam Indigenous, the Naga Hill, Manipur, Cachar, and Lushai Wild and Cultivated Teas.* (See figs. 3, 7, and 8.)

Race 1, Assam Indigenous (see figs. 8 and 13).—A large bush or small tree with the leaves from 4 to 7 inches long and 2 to 3 inches broad; ovate, oblong, acuminate, thin, almost membranous, curved and inflated, with, as a rule, sixteen primary nerves, and the tissue between these thin, crisp in texture, pale green in colour, bullated and profusely reticulated, pale green on the veins; under surface roughened by a multitude of fairly large warts that produce the effect of being impressed from above by a multitude of sharp points. Inflorescence often solitary; flowers stalked, but not borne on a distinct common peduncle.

The flowers of all the tea-yielding *Camellias* hardly differ except in size, but in the first three varieties here indicated the sepals are large, imbricating, and glabrous, except for the ciliate margin. In the third the sepals are densely coated with ferruginous hairs.

There are numerous sub-races of the present plant, such as the Singlo, Bazelona, &c. It is the most abundantly cultivated and most highly prized of all the Indian races.

Race 2, Lushai (see fig. 13).—This becomes a poplar-like small tree of perhaps 50 to 60 feet in height. Leaves when full grown average from 8 to 14 inches in length and as much as 4 to 6 inches in breadth. It is the largest-leaved form of the tea plant as yet made known; far larger than anything recorded regarding the tea plants of China. The leaves possess from twenty-two to twenty-four prominent veins, but in texture and surface markings are identical with the Assam indigenous. This form has only to a small extent been grown in Sylhet and Chittagong, and it exists almost entirely as a local manifestation of the wild plant.

Race 3, Naga Hills (see fig. 13).—A small straggling tree with few ascending branches. It is especially plentiful near Pherima at an altitude of 2,000 feet. Leaves much elongated, linear, oblong, from 4 to 9 inches in length and only 2 to 3 in breadth at their greatest diameter. In texture &c. it much resembles the Assam. It has to some extent been cultivated in Assam, as, for example, at Anguri, and it is reported to have been specially used in crossing with the "Assam Indigenous."

Race 4, Manipur.—The wild tea plant of Manipur is never cultivated in the State of Manipur; it is there purely and simply a wild plant, found in the forests. When carried to Cachar, Sylhet, and even Assam, however, the Manipur stock has been fairly largely grown and even crossed with some or the other stocks. It is characterised by exceptionally broad leaves, almost elliptic, oblong in shape, and measuring 6 to 8 inches in length and $2\frac{1}{2}$ to $3\frac{1}{2}$ in breadth. In texture the leaves are soft and leathery, are of a dark green colour, and have the reticulations sparse and open. This is in fact one of the broadest-leaved forms of the Indian indigenous races, and has probably contributed largely towards the formation of the specially dark green plants, seen in many plantations, but which are regarded as being "Assam indigenous tea."

Race 5, Burma and Shan.—Too little is known regarding these tea plants to allow of critical separation from the other races; the present position is, therefore, only preserved to allow of more careful elaboration in the future. They constitute a series that blend into the Manipur stock on the one hand, into that of Yunnan on the other. The leaves are smaller, thick, coarser, more acutely serrated, and much less smooth than the Manipur, but distinctly elliptic in shape. The Formosan leaf (see fig. 13), recently brought into notice in connection with the inquiry into *Oolong* tea, is a little more oblong than the

Burma and Shan leaf, but otherwise is very similar. I have not seen, however, more than a few separated leaves of the *Oolong* plant and cannot be certain regarding its identity. So far as I can judge it stands every chance of proving a distinct and well-marked race, fully worthy of separate recognition.

Race 6, Yunnan and Chinese.—Too little is known of the races of the tea plant in China to allow of a classification being furnished similar to that given for India. As already mentioned, one of the oldest botanical specimens extant was procured from the Malabar coast of India some time between 1698 and 1702. Fortune, while he admits that he found this form occasionally all over China, speaks of the country south of the Yang-tse-kiang as the region of *Thea viridis*, the tea being shipped from Shanghai and Ningpo. In most herbaria the plant is fairly well represented from China, but by no means exhaustively so, until in very recent times, more especially through Dr. Henry's collections. Dr. Henry has studied the tea plant of the forests of Yunnan, and his specimens have been widely distributed in herbaria. He tells me that it is a small, sparsely branched tree, met with under the dense shade of forests—precisely the condition of the Indian truly wild forms. His No. 9,722, collected south of the Red River, and absolutely wild in virgin forest at 7,000 feet in altitude above the sea, as also his No. 10,377 (a), are both exactly intermediate in type to the Burman and the Naga hill forms. But Dr. Henry also collected the same plant in the province of Hupeh (No. 7,822) and Dr. Faber on Mount Omei, Szechwan (No. 342), where it was regularly cultivated. Of his Ibang (Chinese Shan States) sample (No. 13,183) Dr. Henry says it is grown for the manufacture of the celebrated Puh brick tea, the locality where, he is of opinion, tea cultivation probably began in China. The leaves in this case are exceptionally hairy. Fortune collected the var. *viridis* in Japan (Yeddo) in 1860. (Fig 8.)

VAR. β BOHEA (see fig. 9): *Thea Bohea*, Linn., *Sp. Pl.*, 1762, p. 734; also, *Herb.*, n. 152, *The, Tja*; William ten Rhyne, *Observ. de Frutice Thee*, 1675, *apud Breyn*, *app.* 9–17; *Jacobus Breyn*, *Pl. Exot.*, 1678, pp. 111–15, t. 112 (after the plate of W. ten Rhyne, made in Japan in 1675); *Le Comte* (*Nouv. Mém.*, &c., 1692, i. 368), *Tea Cultivation of Fu Kien*; *Tee Sinensium*, *Bocc.*, *Museo Pl. Rar.*, 1697, 130–2, t. 94 (after Breyn); *Thea*, *Kaempfer*, *Am. Exot.*, 605–31 (1712), t. 695, ff. 1–2 (a most admirable picture copied by many subsequent authors); *Thea Bohea*, *Hill*, *Exot. Bot.*, 1759, t. 21; *Lettsom*, *Nat. Hist. Tea Tree*, 1799, pl. facing p. 41; *Hayne*, *Gewächse*, vii. t. 28 (photographically reproduced, fig. 7); *Bot. Mag.*, 1807, xcv. t. 998 (drawn from plant grown at Kensington); *Booth*, *Trans. Hort. Soc. Lond.*, 1830, vii. p. 559; *Rein*, *Indust. of Japan*, 1889, pp. 110–30, t. 1; *Bohea Tea of Fortune and others*; *The Hybrid Tea of Indian tea-planters*. (See figs. 9, 12, and 13.)

A fairly large, much branched, vigorous growing bush, met with chiefly under cultivation, in India entirely so. Leaves medium-sized, linear, oblong, thick, smooth, leathery, often partially closed lengthwise on the upper surface (so as to become concave, in place of convex, as in "Assam indigenous"), and possessed of 10 to 14 primary veins; under surface speckled with what appears like very minute shining scales embedded within the surface, or, when seen on very dry and old leaves, appearing on the apex of exceedingly minute elevated warts.

I am unable at present to establish the races of this plant that doubtless exist, but if its history be correctly interpreted, by the commonly received acceptance of its being a hybrid, it may have originated spontaneously in all the tea districts of the world, or been distributed by seed from one country to another under the belief that it was a distinct and valued race. In the Kew Herbarium there are specimens of it from every tea district in India. Perhaps the oldest Indian-grown sample in existence is Griffith's "China tea plant," a specimen which bears the date of 1845. In the British Museum there are

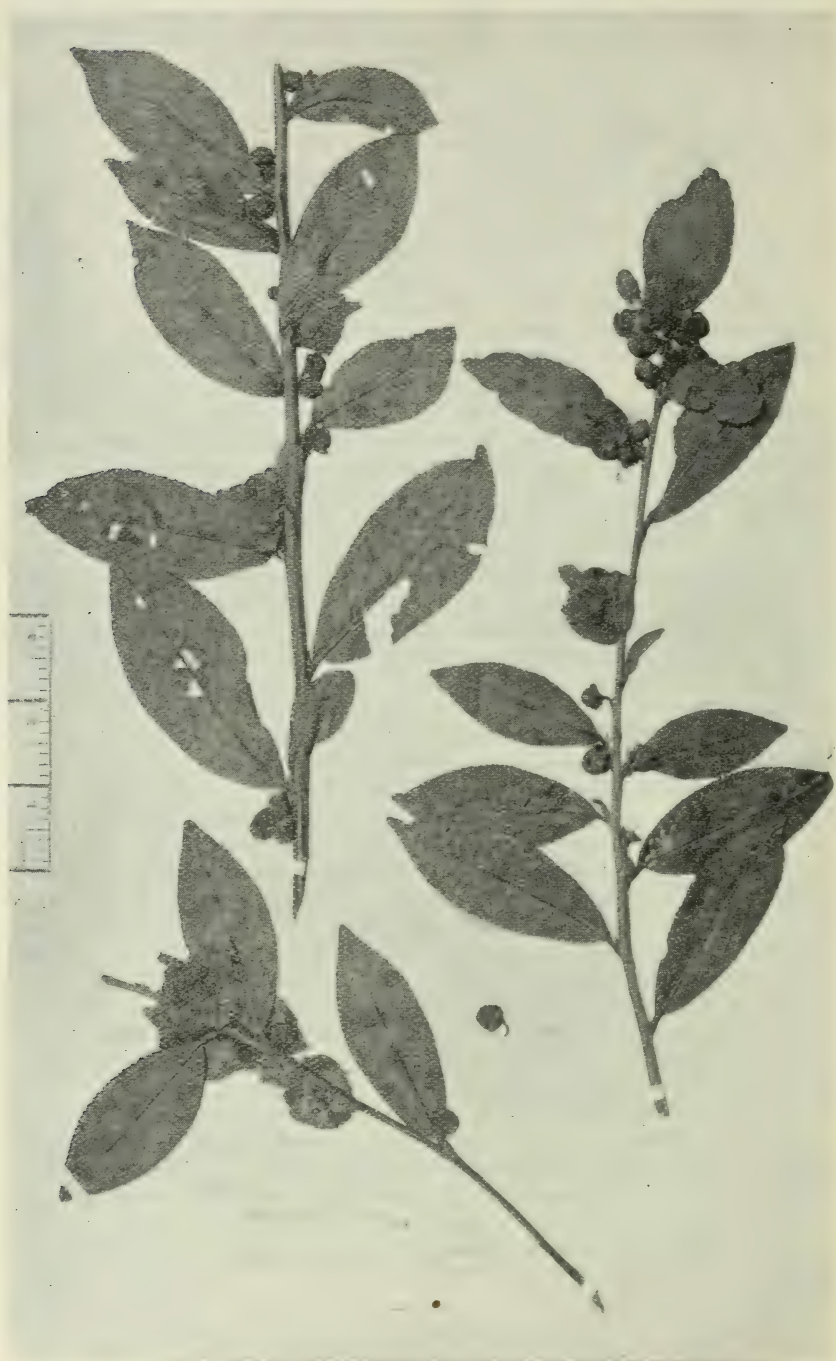


FIG. 9.—*CAMELLIA THEA*, LINK, VAR. *BODEA*.
Nearly half natural size.

several specimens of historic interest, such as those contributed from China by Lord Macartney and by Sir George Staunton, collected in the neighbourhood of Canton. Fortune's specimens are in several herbaria, such as n. 108 of 1845 and n. 18 of 1846. He found this the chief tea plant of South China, Kuang-tung, and in the great black tea province of Fukien, the tea from which is shipped from Canton and Hong-Kong, &c. Dr. Henry also made repeated records of this plant, such as his Ichang sample (No. 2,214 of 1887 and No. 2,499); from Nan-t'o and the mountains northward (No. 1,917 also No. 2,978); Dr. Faber from Mount Omei in Szechwan ("Cult." No. 96). So also at Foochow it was gathered by Carles (No. 735) and said to be there valued for the oil from its seed. In Japan it was collected by Maximowicz at Yokohama and by Oldham at Nagasaki (Nos. 415 and 35 (a)), where Oldham says it is often planted as a fence. From Hongkong (Ningpo Mts.) it has been recorded as rare (Nos. 251 and 252), and is a thick dark green and coarsely serrated form. Hancock observes that the finest teas of the Ningpo monastery were made from the plant collected by him, which proves to be a characteristic example of the present variety. In 1882 Mr. Watters procured it in Formosa, the record on the label of this sample being "Si-tei. This tree has flowers and fruits like the tea shrub, and the leaf is used with and as a substitute for tea." That remark is somewhat curious, since it would suggest that it is a wild species used only in place of the true tea plant of Formosa (*Oolong* tea?).

VAR. γ STRICTA (see fig. 10): Linn., *Herb.* (specimen n. 1, but without name); *T. Chusan* in *Petiver, Hort.*, n. 983 (*British Museum*), collected in *Chusan* (30° N.) by *Cunningham* in 1702; *Thea stricta*, *Hayne, Gewächse*, 1821, vii. t. 27; *Nees, Abild. Offiz. Pflanzen*, 1828, ii. t. 428. *The China Tea of Indian planters*. (See fig. 13, which shows the relative sizes of leading tea leaves.)

A small stunted, much-branched bush that usually does not exceed two feet in height. It is frequently met with in Darjeeling, Kumaon, Kangra, the Nilghiri hills, and some parts of Upper Assam, but, curiously enough, is but indifferently represented in Chinese collections. It has been gathered in plantations in Mauritius, Brazil, Rio de Janeiro (Vauthier's specimen, in Sir W. Hooker's herb., &c.). Martius in the "Flora of Brazil" speaks of it as having escaped from former plantations into the neighbouring hills.

Branches all straight, ascending, very leafy. Leaves small, linear, smooth, thick, leathery in texture, inconspicuously reticulated, rigidly ascending in attitude, and rarely possessed of more than eight, sometimes only six or even only four, primary veins. In length they average from one to two or two and a half inches, and in breadth half to a little under one inch. But in extreme cases the bushes and leaves may be considerably smaller. In the Kew Herbarium there is a seedling which accidentally appeared in Cachar (not in flower certainly), but the whole plant only four to six inches in height, stem, branches, and roots included, but the whole copiously branched. The leaves do not exceed half an inch in length and one-quarter in breadth. (See fig. 13, the smallest leaf shown.)

In var. *stricta* the under surface of the leaf is seen to be copiously besprinkled with the exceedingly minute scale-like structures already spoken of under var. *Bohea*. In fact this peculiarity so unerringly separates these two plants from all the other races of tea that it makes one hesitate to accept either as being hybrids from the larger-leaved forms.

Though I am not aware of this plant having been recorded as met with anywhere in the truly wild or even fully acclimatised condition (except the reference above in connection with Brazil), I have myself met with it in seed plantations where, although grown for years under shade and without being pruned, it had hardly altered any of its characteristics except in becoming larger than is usually the case when found in the tea garden. But, let me



FIG. 10.—*CAMELLIA THEA*, LINK, VAR. *STRICTA*.
Nearly half natural size.

repeat, this, far more than the *Bohea* form, gives evidence of being purely and simply a cultivated variety. In fact var. *stricta* might even be spoken of as but a diminutive form of var. *Bohea* that had often been confused with or mistaken for the next variety.

VAR. δ LASIOCALYX (see fig. 11) : *Thea lasiocalyx*, Planchon MS. (recorded on a sheet in Wallich's Herb. at Linn. Soc., also Kew Herb.) ; *T. viridis*, Wall., Cat., n. 979 ; but in Wall., Herb., at the Linnean Society, n. 979 consists of two specimens—one said to be from Singapore, the other from Penang.

A small bush copiously branched and clothed with many small linear-oblong (or obovate), acute cuneate leaves, about one to two inches in length, and half an inch in diameter, thick, fleshy, of a pale lemon-green colour when dry, almost quite glabrous, except a few shaggy hairs near the midrib on the under surface, and with the minute, scale-like shining points below (described in connection with vars. *Bohea* and *stricta*) very abundant. Inflorescence axillary, crowded on the erect young shoots in the form of umbellate clusters of three to five flowers, pedicels very short, but with two or three scales and joints. Calyx forming what simulates two distinct whorls, the inner erect and the outer somewhat spreading, sepals small, round, more or less densely coated with adpressed, rust-coloured, shining hairs.

Habitat.—Malacca and Penang, but probably only cultivated. Wallich's specimens are stated to have been cultivated in Penang, and they bear the dates of 1822 and 1829. Cuming collected the same plant in Malacca in 1841 (Nos. 2,267 and 2,268 (photographed in fig. 11)). Griffith has two samples, one from Malacca (named *T. Bohea*), the other apparently grown in India from seed supposed to have come from China. There is also in the Kew Herbarium a second sample found under cultivation in India, namely, in Hohenacker's herbarium, collected at Mangalor in 1847. In Gay's herbarium there is a sample said to have been grown in the Luxembourg Garden from seed furnished by Hardy in 1816. The sheet contains both this plant and a sample of *C. thea*, var. *stricta*.

This curiously interesting tropical variety of *C. thea*, Link, may possibly, by future botanists, be regarded as a distinct species. I have preferred, in removing it from the obscurity and ambiguity with which it has hitherto been enveloped, to retain it as a variety of the tea plant—first, because it appears to be cultivated in the belief that it is one of the forms of the true tea plant ; secondly, because it is a more distinctly tropical plant than any of the other known varieties ; and thirdly, because it may have originated some of the so-called varieties or hybrids of the tea plant, such as var. *stricta*. The present plant has not been recorded from China, nor for the matter of that has var. *stricta* any well-defined position in China, notwithstanding the fact that by Indian planters it is denominated "China tea." The specimens of var. *lasiocalyx* seen by me were mostly procured in the Malay Peninsula, but whether exclusively from cultivated or some of them naturalised or wild plants has not been stated. The following authors (in sequence of date of publication) who deal with the species of *Ternstroemia* of Malacca and Penang or the adjacent tracts, do not appear to have described the plant here indicated : Miquel, "Fl. Ind. Bat.," 1860, i. pp. 189–90 ; King, "Materials for a Fl. Mal. Penin.," i. (pt. 2, 1890), pp. 125–46 ; Curtis, "Cat. Fl. Pl. Isl. Penang," 1892 ; Ridley, "Fl. Singapore" ("Jour. Straits Branch Roy. As. Soc."), 1900, pp. 48–9.

I have mentioned these works because the silence regarding this plant may denote that it may have existed under cultivation, and have been mistaken for the true tea plant, which, being introduced, was not thought worthy of a position in works of the nature indicated. But this silence rather heightens the interest in the plant, since it is a well-marked and easily recognised form of tea, that, as already suggested, may have played an important part in the growth of the present tea trade, prior to the establishment of var. *viridis* as essentially "the tea plant" of modern commerce.



FIG. 11.—*CAMELLIA THEA*, LINK, VAR. *LASIOCALYX* (MALACCA OR PENANG TEA PLANT).
Natural size.

There is a tradition, very general in China, that the tea plant came from the province of Yunnan. Dr. Henry tells me that he has never met with it in a wild condition, except in the portions of Yunnan that border on the Shan States. There it occurs not only under precisely similar conditions to those in Assam, the Naga Hills, Manipur, Cachar, the Lushai country, and Burma—namely, under shade in rich forest tracts, on low, undulating hilly country, from 2,000 to 7,000 feet above the sea—but within practically identical latitudes, though at slightly higher altitudes. In Yunnan the plant collected by Dr. Henry (many specimens of which are in the Kew Herbarium) closely approximates to the Indian indigenous forms, and these together constitute the *Camellia (Thea) viridis* of the early authors. An extensive series of Chinese samples may be seen in herbaria collected by most travellers who have given attention to the plants of China, but in no instance have I come across a sample with the vigour of growth seen in the Lushai or even the Manipur plants.

On the other hand, on passing north and north-eastward from Yunnan, through the tea districts of South China, we first meet with forms that correspond with the much-prized “Assam indigenous” of the Indian tea-gardens, and then the intermediate plant, some of the states of which have in India been called the Assam-China hybrid (fig. 12 A)—the *Camellia Bohea* of the early botanists—and finally, in the higher latitudes of cultivation, it would seem probable that the stunted plant which in India is alone designated the “China tea”—the plant to which Hayne gave the name *C. stricta*—makes its appearance. On the more western and north-western tracts of China, up to the Yang-tse-kiang, the variety *viridis* would seem to be the most abundant form. One of the interesting specimens of that variety, as already stated, will be found in the Sloane herbarium of the British Museum; it came from Chusan, and was named (by Petiver), in consequence, *T. Chusan*.

Thus in the south-western and western portions of the area of tea production the plant might be described as almost tropical, and as becoming a tree with leaves a foot or more in size. In the north-eastern and eastern regions it is a bush of temperate climes, with leaves often not materially greater than one inch in length.

There would thus seem no doubt that the original home—the wild habitat—of the chief commercial form of the Indian tea plant, if not also the original home of the species *Camellia Thea*, extends from 23° to 27° N. latitude, and embraces portions of the Lushai, Cachar, Assam, Manipur, the Shan country, and the Yunnan province of China. It is, however, not anywhere an abundant plant, and has never been recorded as truly wild except when found under the shade of trees. By cultivation it has been carried many degrees both north and south of that area: in Ceylon, for example, it exists at 6° N., and in Malacca even still nearer the equator, while in Japan it is grown at 40° N., and in China it has been successfully acclimatised at 36° N. latitude, but as a cultivated plant only.

According to certain specimens of fruits and seeds preserved in the British Museum its cultivation would appear to have been attempted in Jamaica (17° N.) even in the time of Sloane. In recent reports of the United States Department of Agriculture mention is made of the



FIG. 12 A.—*CAMELLIA THEA* LINK, VAR. *BOHEA*
(ASSAM HYBRID).



FIG. 12.—*CAMELLIA THEA* LINK, VAR. *VRIDIS*
(ASSAM INDIGENOUS).

experiments in tea production in South Carolina (34° N.), and even in Texas, at Pierce. Dillenius ("Hort. Ethamensis," 1732, p. 392) suggested the possibility of tea being grown in Virginia and Carolina. He added that

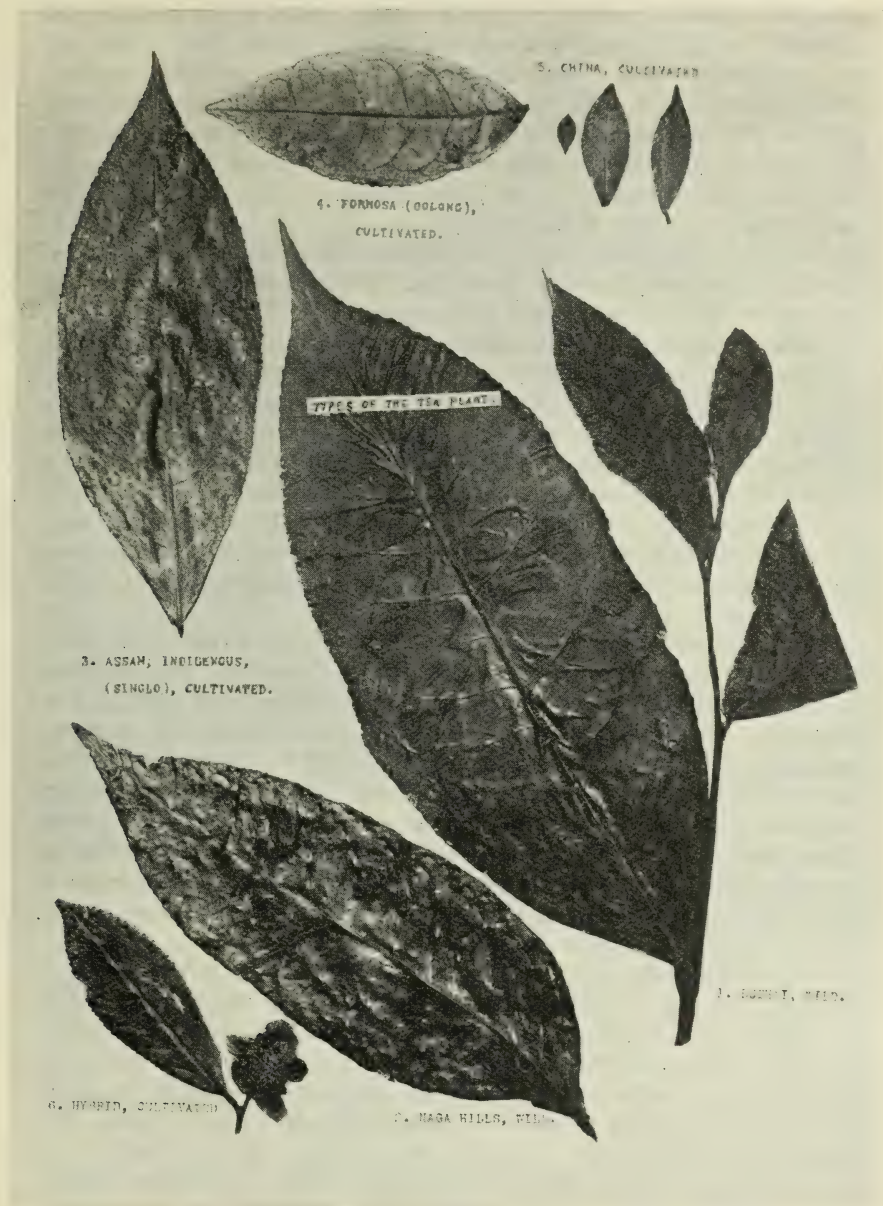


FIG. 13.—TYPES OF THE TEA PLANT.

as early as 1687 it had been successfully conveyed to the Cape of Good Hope by Andreas Cleyerus, through the agency of George Meister, as testified by Meister in his account of his travels in Japan and Java.

It is somewhat significant that on the south of the Equator the success hitherto attained has been much less than on the north. The best results have been attained in Java (7° to 8° S.), the traffic from which direct, as well as *via* Holland to Great Britain, has for some years assumed a distinct position. In 1833 Telfair speaks of tea as cultivated in Mauritius (20° S.), and his specimens, which are in the Kew Herbarium, are var. *stricta*, but in Gay's herbarium there is a specimen from that island of var. *Bohea*, collected in 1858. Vauthier gathered a specimen of var. *stricta* in Brazil; Jervise found it being grown at Antioquia, in Venezuela, and Macrae still further to the south at Rio de Janeiro (23° S.). More recently it has been grown in German East Africa between approximately 6° and 8° S.

The truly wild plant would seem almost invariably to be the exceptionally large-leaved forms of *C. viridis*. When carried remote from its original habitat, as, for example, to the south of the Equator, var. *stricta*, the least desirable of all forms, is that chiefly met with. We are thus led to believe that very possibly the departures from the type of var. *viridis*, which are both plentiful and diversified, may have been brought into existence very largely as climatic manifestations and chiefly through selection and adaptation. It is, however, significant that historically the records of the purer forms of var. *viridis* would seem to point to their having been first used as a vegetable, and probably only utilised long afterwards to form a beverage, when carried beyond their indigenous habitat and converted into the plants that are best designated as *C. Bohea* and *C. stricta*.

For successful tea cultivation the climate must be neither tropical nor temperate. High temperatures, if accompanied with copious rainfall, are less objectionable than high temperatures with a low humidity. The best results are obtained when, during the growing season, the daily variations are, say, from 75° to 85° F. If the temperature falls to 70° (or below 70°) F. the growth will be slow, and consequently the interval between the flushings increased. In the best parts of Assam the rainfall may exceed 100 inches, but 60 inches will suffice, provided it be fairly well distributed throughout the hottest months. Temperatures above 85° F., with a corresponding high rainfall, produce coarse plants and an inferior quality of tea.

The ideal climate is probably that of Assam, but the hilly and colder districts, such as Darjeeling, Kumaon, Kangra, and the Nilghiri Hills, produce as a rule superior qualities of tea, but not sufficiently so, in some cases, to compensate for the very much lower yield. It is deemed a desirable condition that there should be a winter of a few weeks' duration at least, in which the temperature falls sufficiently to put a temporary check on further growth. In this respect India differs entirely from Ceylon; in most of the Indian tea districts there is a distinct winter, during which a certain amount of frost may be recorded.

Agricultural Methods.—It is the object of tea-planting to produce a large and regular supply of fresh shoots—"flushes," as they are called. In vigorous gardens the flushings of fresh shoots may occur once in every eight to ten days. The young leaves only are capable of being made into good tea, and the smaller and younger they are the finer the quality of

tea. This has accordingly led to various systems of plucking. Bruce in his report of 1838 speaks of the "people employed nipping off with the forefinger and the thumb the fine end of the branch, with about four leaves on, and sometimes even more, if they look tender." For some years past the rule has become all but universally accepted to pluck only two leaves and a bud, and in some gardens (or for special purposes) only one leaf and a bud. Thus, much finer plucking, with, in consequence, better quality of tea, has recently become the rule than formerly prevailed.

Tea cultivation is thus a very different agricultural operation from that of wheat-growing or even of fruit-growing. The plant is not raised for a supply of fruits or seeds, nor for tuberous roots or fibre-yielding stems, but for a succession of fresh shoots. It is, moreover, a perennial, and necessitates special treatment to ensure the objects of crop rotation. A liberal root-production is essential; an open, well-drained soil and an ample supply of readily obtainable soil food are essential to nourish continuous flushing.

It need be no matter for surprise that during the past fifty years or so the methods pursued in almost every operation have been changed, such, for example, as those of pruning, plucking, draining, manuring, &c. Knowledge has been unremittingly sought after; traditions, largely acquired through the early instruction of the imported Chinese tea-planters, have had to be uprooted or abandoned and improved and more rational methods substituted. The result can be briefly characterised as vast economies effected, finer quality and greater purity attained, and enhanced yield to the acre accomplished. To secure improvement in quality and reduction in price is no mean achievement in any industry, and the extent to which India has thrust China out of the markets of the world is but the natural consequence of this progression from primitive rules of thumb to rational and scientific methods. This view may be abundantly confirmed by the figures showing the yield per acre. In 1873-74 the crop of Assam averaged 250 to 280 lb. per acre; in 1904-05 it averaged 450 to 500 lb. And let it be once more repeated, the leaf now plucked is much finer than formerly.

The manufacture has been similarly revolutionised. Rolling the leaf by hand and foot has long since been abandoned in India. Drying and firing over open charcoal fires (with the attendant evils) are systems discontinued thirty years ago. Since the first feeble efforts at manufacture by machinery, in the early sixties, stage by stage the older and cruder methods have disappeared, and now the work from first to last in the Indian tea factory has become, to all intents and purposes, an automatic process, in which the risk of adulteration and uncleanness has been reduced to an almost negligible quantity.

DETERIORATION OF STOCK.—After what has been said of the tea plant being a perennial which grows "year in year out" on the same soil, and is made to yield a succession of weekly or fortnightly "flushes," and to endure the severe annual pruning essential to the succeeding year's "flushings," little surprise need be expressed at the stage being ultimately attained when the plant becomes exhausted and diseased. Moreover, since no rational selection and development of stock has as yet been attempted in the tea industry, other than to see that supplies are drawn from certain reserved plots of "Assam indigenous" or

certain forests of wild tea, the stock cannot be held to have been improved, but, on the contrary, is rather degenerating. A few gardens allow certain plants to grow unmolested in order to produce seed, from which they obtain a supplementary revenue. This is a most reprehensible system, since the seed almost of necessity is not only a hybrid but a tainted stock. There is no professional seed-grower in the Indian tea area, and, therefore, no instance on record where definite selection toward quality of tea or suitability to climate and soil has been skilfully and persistently conducted. In the seed gardens that exist it is by no means uncommon to find two or more widely different plants growing side by side, and all treated as one and the same. Moreover the plants that are yielding seed to-day have done so perhaps for the last thirty or forty years. Little or no attempt is thus made to ascertain whether or not the seed-bearing plants are becoming diseased or exhausted, or to prevent the seed collected being a hybrid of all the plants in the seed garden in place of a pure stock.

In a work entitled "The Pests and Blights of the Tea Plant," written by Dr. Mann and myself, many pages will be found devoted to this subject. Even the briefest discussion of the various issues there raised would occupy many pages. I will, therefore, only abstract one or two passages. "The tea is forced to produce an abnormal or disproportionate amount of leaf; and it has been removed from the shade of the forest and from the association of its favourite and helpful plants. Indeed, it seems very likely that the so-called rest that the plants obtain in winter is more than obliterated by the annually recurring effort that is required, shortly thereafter, to recover from the severe shock of the pruning (and probably also the deep hoeing) to which they are subjected."

It is, perhaps, hardly necessary for me to repeat that one of the most urgently necessary reforms that remain to be faced by the planters is the establishment of professional seed gardens, where the improvement of the races (by the selection of individual plants of proved merit, such as the production of a high percentage of leaf, quality of leaf, suitability to climatic conditions, freedom from disease, and the like) may be systematically prosecuted. And when this is seriously attempted, it most likely will be found that much the more rational and satisfactory way will be to work back from the tea garden itself, instead of forward from the so-called "jungle seed garden."

UNIFORMITY OF STOCK.—I need not repeat, what has been urged so fully in the "Pests and Blights," all that can be said on this subject. Gardens of mixed stock are far less productive than those in which a great proportion of the plants grown are of one race. It is also fairly established that mixed stock favours the increase of pests and blights. Pure "Assam indigenous," for example, is much less addicted to mosquito,* red spider, &c. than are the so-called "hybrid" and "China" teas. It is in the plots of inferior races (*jats*) that these and several other pests first make their appearance, and once established they spread to the higher grade teas. "To plant out a garden with some half a dozen *jats* of tea, one bush China, another Assam, a third an inferior hybrid—or shall we put it two-thirds Assam and one-third inferior *jats* (dispersed throughout the better *jats*)?—is to provide the conditions necessary for blights of all kinds to attack the entire garden simultaneously. It was a mistaken notion that to plant Assam and China bushes together secured a good blend of the properties of the two stocks. It has long since been proved to satisfaction that there are

* This term "mosquito," which is well understood by the Planters, is not meant to designate the insect usually known by that name, which is a gnat, but an insect (*Helopeltis theivora*) belonging to quite a different natural order, the *Hemiptera*, or plant bugs.—Ed.

mechanical difficulties in collecting and manufacturing leaf of mixed size, age, and thickness. Moreover differences of *jat* involve a further difficulty in the season of 'flushing' and the time necessary to mature each successive 'flush.' If a plot of land be, therefore, plucked when the one *jat* is ready, the others may be too old or too young, and a loss that may be appalling may thereby be sustained." Blending cannot be accomplished at the garden; it would accordingly be infinitely preferable for each garden to grow but one plant, or if early and late "flushings" be desired the necessary plants had better be grown on perfectly distinct plots and worked separately.

Another point that should be borne clearly in mind is the necessity for each distinct locality producing and perfecting its own stock. In the Upper portion of the Assam Valley infinitely the best plant is the "Assam indigenous." Below Gauhati, on the one bank, and Bishnath, on the other, however, there seems no doubt that the "Manipur plant" would prove the best stock. So also in Chittagong, the "Assam indigenous" has not been a success. In Darjeeling and other hilly districts the "China plant," or some of its hybrids, have proved the most desirable stock.

The subject of seed selection and development in direct adaptation to each locality should therefore receive the careful consideration of all interested in tea-planting.

CULTIVATION.—In India the tea plant is invariably grown from seed, and it is generally believed that propagation by cuttings and layerings has never been a success. In fact, transplanting even is considered nowadays a task that requires great care, and special appliances have been invented for that purpose. Curiously enough, however, Bruce, the first Indian tea planter, held quite the opposite opinion. To show how very hardy the tea plants are, he mentions that many hundred seedlings, plucked out by the root, had been brought from their native jungles in baskets, with only a little moist earth at their roots, and carried from seven to twenty days before being replanted. He also observes that he had cut off branches of the tea plant and laid them horizontally in the ground with an inch or two of earth over them, and they had thrown up numerous shoots the whole length of the branch, while other branches simply pushed into the ground had grown. In passing it may be added that Bruce refers to the success that had attended his cutting the plants down level to the ground and afterwards firing the plantation.

But to revert to the system of cultivation that prevails at present. In the seed plantations the plants flower in September and the seeds take a year to come to maturity. The seed is therefore procurable in November and is packed and despatched in dry soil. A box containing 40 lb. of shelled seed will usually weigh from 120 lb. to 180 lb. The seed is sown (sometimes already germinated), as soon after it is received as possible, in nurseries, the seeds being placed 4 to 6 inches apart and an inch deep. Forty pounds of seed may be expected to give about 10,000 plants, or sufficient to plant two and a half acres of land. The seedlings, as soon as they show above ground, have to be shaded. Seed sown in November to December will be ready for planting out the following May to June (six-month-old plants) or when they are a year old the following November to December.

Planting out.—The distance apart at which the garden should be laid out depends upon many considerations, such as the race of the plant used, richness

of land, depth of drains, and method of planting. It is, as a rule, not wise to plant nearer than four feet nor wider than five feet each way. Four and a half feet each way would be equal to, say, 2,000 plants to the acre. Much difference of opinion prevails as to whether the lines of plants should be at right angles or diagonal. In the latter case (triangular planting) they can be about five feet apart, whereas on the square four-and-a-half feet, to give the same amount of plants to the acre.

Draining, Hoeing, Manuring, and Pruning are operations of vital importance, regarding which full particulars will be found in "The Pests and Blights of the Tea Plant." I desire to bring before you, however, features of the plant that have, or may have, an immediate bearing on the production of the various qualities of tea, and not to write a complete essay on tea planting.

Plucking.—Dr. Mann, in a communication I have recently received, writes that the annual course of plucking after light pruning is about as follows: When the tea has been pruned new shoots begin to grow, and after two or three months have attained a length of 9 inches or more. At this stage the bushes can be "tipped," that is to say, the first lot of leaves may be taken off, the object not being so much to get the leaves as to force the production of secondary shoots on the plant. This "tipping" should be done when there are, in the centre of the bush, *on the average six leaves* without counting either the unopened tip leaf or the so-called "phaki" or "janum" leaf (a bud scale) at the base of the shoot. The shoot of two leaves and bud, on the extremity, is nipped off; but it is a common rule to furnish the pickers with a stick as a measure. No shoots anywhere on the bush below the height of the measure to be plucked. (See fig. 14.)

This nipping off of the terminal buds forces out a secondary growth from two or three buds on the shoot, and in about three weeks' time the tips of these secondary shoots are ready to be plucked, and on these being removed there are left behind two mature leaves with their buds. A third series of shoots starts from the secondary branchlets, and two leaves and a bud are again nipped off, leaving, as a rule, only one mature leaf and subtended bud. A fourth, fifth, sixth, seventh, and eighth "flushing" may be secured. In the early part of the season the pluckings are almost coincident with the growth of successive "flushings." Ultimately the pluckings have to be more frequent, and in Assam the bushes may be plucked twenty to thirty times during the season, or at intervals of from seven to nine days.

It is of importance that the "tipping" of the first shoots should not take place before a fair length has been developed. At least nine inches and six leaves are essential. This gives, not only sufficient buds for the secondary shoots, but allows of good wood on which the succeeding light pruning may take place. It is also essential that the collection of the secondary "flush" should be delayed a day or two more than might at first sight be thought necessary, in order to allow of the formation of sufficient wood and buds to admit the repeated and severe plucking that ensues. After heavy pruning, delay in plucking is imperative, not only to secure the buds, but to make sure that a sufficient number of leaves are left on the plant to ensure its healthy growth.

In Assam plucking commences about March in each year, but July, August, September, and the first half of October are the months of heaviest

yield. After that period the crop gradually diminishes, and in Upper Assam plucking ceases for the season by the middle of December, while in

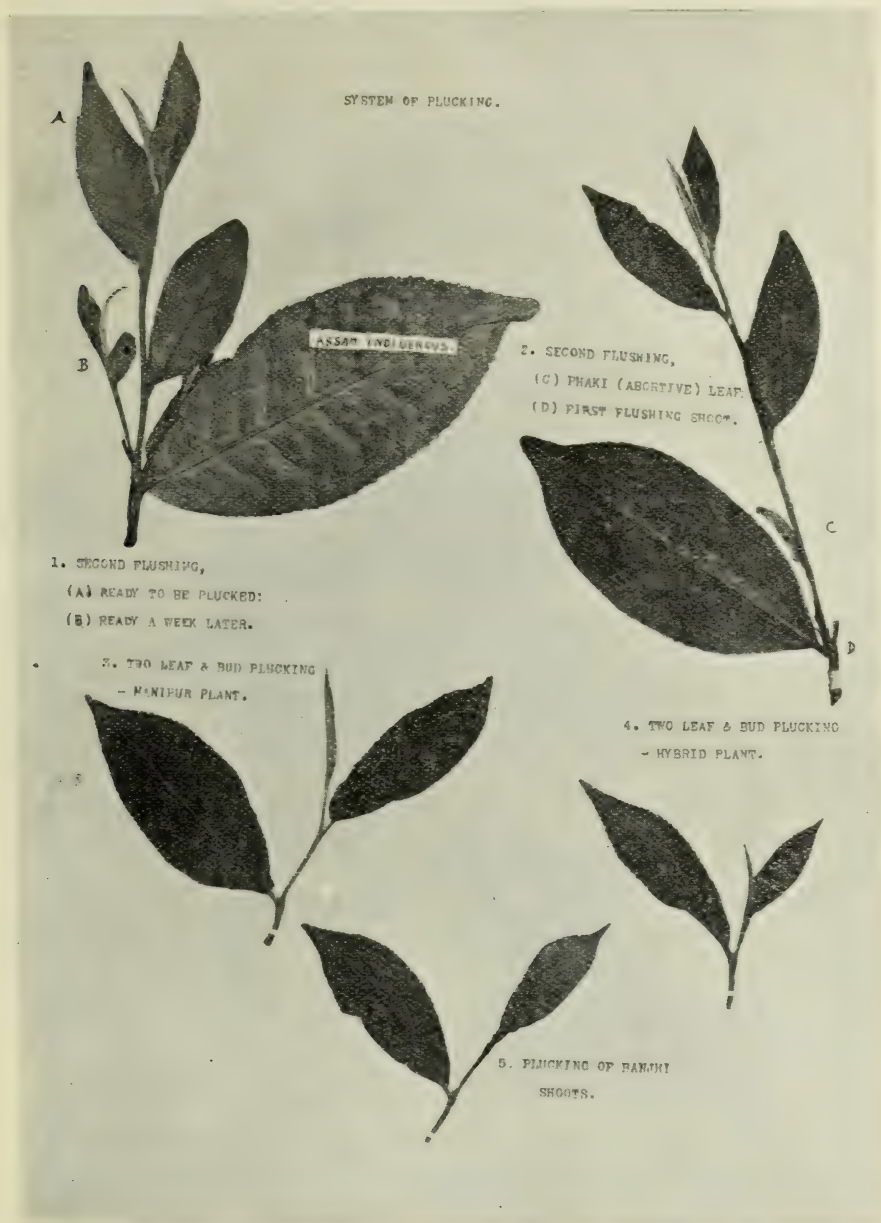


FIG. 14.—SYSTEM OF PLUCKING.

Sylhet it continues till January. The yield at each plucking during the height of the season may touch 120 lb. of leaf per acre or even more, and thus give about 30 lb. of made tea.

Yield.—The object of the tea grower is to get (as Dr. Mann very truly observes) the maximum number of young shoots on the bushes in each year, since it is only the two, three, or at most four youngest leaves on any shoot which can be made into tea. A very small crop may be taken from the plants when two years old; in the third year about 150 lb. an acre may be gathered; by the fifth or sixth year (in the plains gardens) the plants will be in full bearing, and yielding from 400 lb. to 1,000 lb. per acre a year. Any crop above 700 lb. to 800 lb. an acre is, however, very abnormal, and is due to special conditions. The average of 500 lb. for Assam gardens would be a safe estimate.

MANUFACTURE.—The tea leaf when plucked may be made up into various classes of teas, such as (a) black tea, the bulk of the Indian manufacture; (b) green tea, made by special machinery recently invented, and by native planters in Kangra; (c) Oolong tea, made in Formosa and quite recently attempted in India; (d) brick tea, made by a few estates in Darjeeling and Kumaon for the Tibet and Bhutan markets; lastly (e) letpet or pickled tea, produced in Burma. Of each of these classes of teas there are grades or qualities that depend on the soil on which it is grown, the system pursued in manufacture, or the care bestowed in every stage of production, far more than on the plant. In fact the degree to which flavour and quality depend upon the plant has not as yet been established. The value of the stock, according to our present knowledge, depends more on yield, convenience of manufacture, freedom from disease, and the like, than on any ascertained influence on quality. This can be most emphatically affirmed: green and black teas are not produced by different plants, and the qualities of black tea are purely and simply a matter of assortment or sifting. Leaf of one size and age forms one grade, leaf of another a second, and so on. There are no separate plants grown for "Flowery Pekoe" more than for "Souchong." While that is so, different localities and even individual gardens have undoubtedly reputations for quality that turn very largely on the plant as well as the soil and methods of production and manufacture.

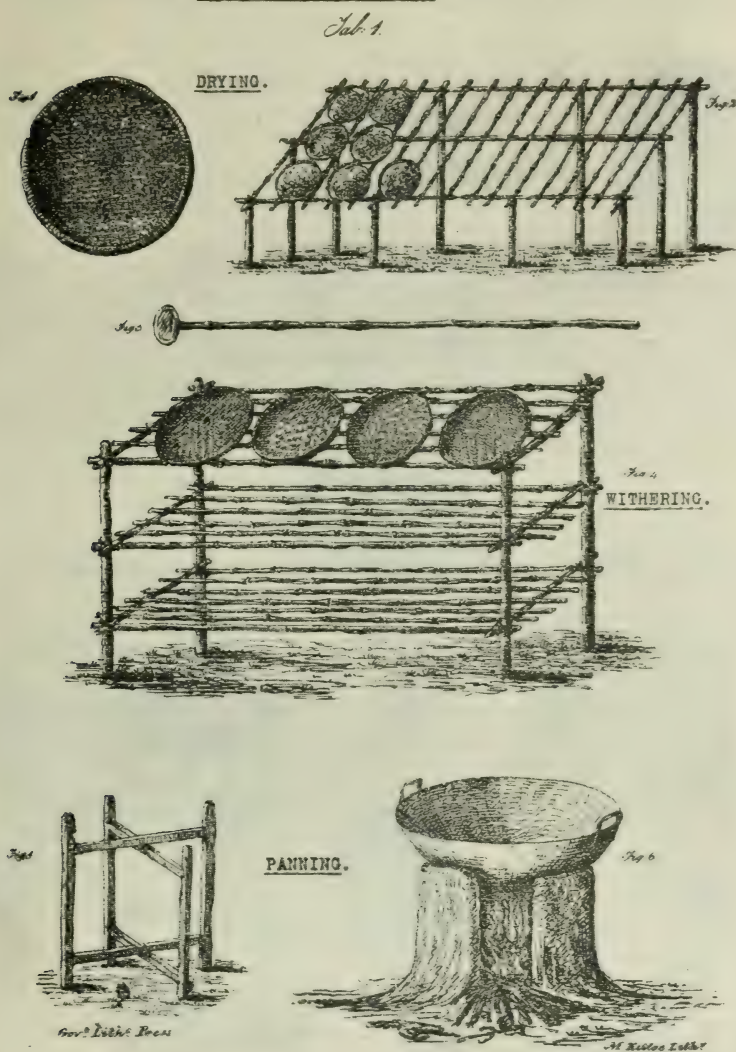
Dr. Mann writes me, on the subject of manufacture, that "the methods pursued have undergone a complete change in practice, if not in principle, by the introduction of machinery. Previous to 1860 and almost entirely previous to 1870 hand labour was exclusively employed to prepare the leaf for market; now the whole work is done by machinery, much of which is largely automatic. The machines used for the several processes in black-tea preparation have been produced by three or four inventors, and the names of Kinmond, Jackson, and Davidson almost entirely cover the field."

I do not propose to discuss fully the old methods of manufacture. Their chief characteristics might be said to be their clumsiness and untidiness. By hand labour it is almost impossible to produce pure tea, so that machinery has not only cheapened but purified our teas. Anyone who has witnessed tea made by hand labour would, I venture to think, resolve never to drink tea again.

Mr. C. A. Bruce, in his "Account of the Manufacture of Black Tea in Assam" in 1838, gives the appliances then in use, and since his little book is not very readily procurable I reproduce his illustrations (See figs. 15 and 16). Stands were prepared (fig. 15, 2) upon which large flat baskets (fig. 15, 1) might expose the tea to the blaze of the sun. This was called the "drying" stage. The illustration

shows the stand with a few trays, as also the rod (fig. 15, 3) by which the trays were pushed up or pulled down upon the stand. The trays of dried leaf were

FIRST APPARATUS USED IN THE MANUFACTURE OF TEA IN INDIA.



ACCOUNT OF THE MANUFACTURE OF BLACK TEA IN ASSAM IN 1838

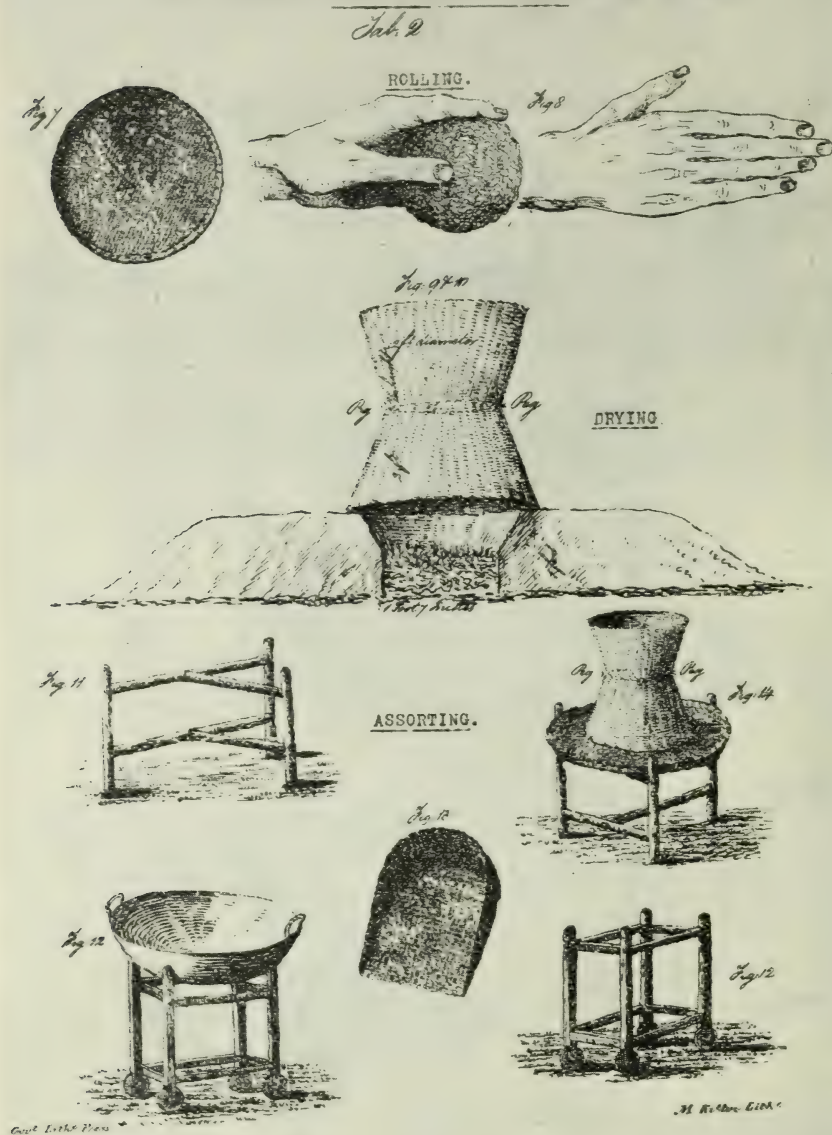
by MR. C. A. BRUCE.

FIG. 15.—FIRST APPARATUS USED IN THE MANUFACTURE OF TEA IN INDIA.

then placed on a second stand set in the shade (fig. 15, 4), to allow of the "withering" of the leaf. After withering, the leaf was thrown into a cast-iron

pan, made almost red-hot by being placed over a fire (fig. 15, 6). This was called "panning" the leaf. The panned leaf was then thrown into a tray (fig. 16, 7)

FIRST APPARATUS USED IN THE MANUFACTURE OF TEA IN INDIA.



ACCOUNT OF THE MANUFACTURE OF BLACK TEA IN ASSAM IN 1838
by MR. C. A. BRUCE.

FIG. 16.—FIRST APPARATUS USED IN THE MANUFACTURE OF TEA IN INDIA.

and deposited on a table, where it was rolled into a ball, and then the "rolling process" continued within the hands (fig. 16, 8).

After being rolled the tea had to be "dried." This was accomplished in a basket shaped like an hour-glass and placed over an open charcoal fire (fig. 16, 9 and 10). The basket was lined with paper inside to retain the heat and prevent the loss of tea. After being dried the hour-glass basket was placed over a tray and the tea shaken out (fig. 16, 11). Lastly it was assorted according to quality by women and children, who, sitting on the floor among the tea, took up in the basket (fig. 16, 13) a small quantity at a time and hand-picked it.

These appliances show the process of manufacture taught by the Chinese who were conveyed to India specially for that purpose, and, crude though these methods and contrivances were, they are the prototypes of the machinery at present in use. In two respects only is the system just described departed from in modern Indian usage: first the drying in the sun previous to withering, and second the panning before rolling have been, for thirty years at least, entirely discontinued in India.

It must suffice for our present purpose to deal very briefly with the modern methods of manufacture of black and green teas separately, and for the purpose of furnishing the most accurate and approved opinions I shall draw largely from the communication recently to hand from my distinguished and indefatigable colleague Dr. Harold Mann.

BLACK TEA.—Withering.—The first stage after the tips of leaf have arrived at the factory is to *wither* them. For this purpose they are spread very thinly on special trays made of jute canvas or wire netting and arranged in tiers in a specially constructed withering house. On the hills this is usually a loft which can be closed and warmed with hot air. In the plains similar lofts fitted with fans to draw the air over the leaf are often seen, but the consensus of opinion seems to be that in attempts to shorten the drying stage by raising the temperature over 80° F. the quality of the tea suffers. In the districts that produce the best Assam teas withering is almost entirely carried on in houses open to the outside air. In cold as also in damp atmospheres withering would be injuriously delayed, and so hot air becomes a necessity. The leaf must wither, or become flaccid, and if too much time be spent before this condition is attained, the tea is always inferior in quality. At a temperature of 80° F. withering should be complete in twenty hours, and the maximum of thirty hours cannot be exceeded with safety.

The process of withering is a very important one. If well carried out, the amount of tea ferment (enzyme), which afterwards causes the change in the leaf known as fermentation, nearly doubles in quantity; during that operation the soluble matter in the leaf considerably increases as well as the tannin, to which the pungency of the finished leaf is due.

Rolling.—The pressing-out of the juices of the leaf into contact with the air is the essential part of this process. It was accordingly soon perceived that machinery might be devised which would bring about this result more completely and economically than had been done by rolling with the hand or foot. During the past forty years there has been a succession of machines for this purpose. It would be beyond my province to describe these or to express opinions on the merits of the various patents.

The principle of all these machines is the same, namely, the rubbing of the leaf between two surfaces, either rotating in opposite directions or

working at right angles to each other. Briefly it may be said that the lighter the rolling, the more juice remains in the cells, and a light-coloured tea is obtained in which the whitish colour of the immature tip-leaf is only slightly stained, thus giving a pretty-looking tea full of "golden tip." If the rolling be hard, much juice is pressed out, and a much darker liquor is obtained from the finished tea, with more "body" but less pungency and containing less "golden tip." The time taken for this process varies from a quarter of an hour to an hour or more. Sometimes the rolling is partly carried out and the leaf sifted through rotating sieves. The finer portions (containing most of the "golden tip") are not again put into the machine, while the coarser portions are subjected to a second rolling under high pressure.

Fermentation.—The juice squeezed on to the surface of the rolled and broken leaf is readily acted on by the air. This naturally, therefore, leads to the so-called fermentation process. Before rolling is complete the edges of the leaves and the ends of the stalks have begun to change from green to a brown colour and to assume a peculiar smell. These are the signs of the commencement of fermentation, which is continued for four to six hours, according to requirements and conditions. For this purpose the rolled leaf is spread out on a specially prepared floor or table in a layer of from one to two inches deep. It is kept cool and perfectly clean. It rapidly turns brown and commences to smell like finished tea. The exact time or degree of fermentation required has to be determined by the skill of the manufacturer, and it is then of a coppery-brown colour. The changes that have taken place are even now very obscure and need not be here discussed.

Fermentation being complete, the product must now be dried off or fired, and this operation has to be done as rapidly as possible. Formerly this was clumsily accomplished over open fires; now it is brought about within machines that make use of a current of hot air drawn over the tea for that purpose. The firing usually is commenced at a high temperature, the air entering the machine at 220° to 240° F. When the drying is about three-quarters completed a somewhat lower temperature is employed from 180° to 200°. It is imperative that the drying be expeditiously accomplished, since if protracted much of the pungency of the tea is lost.

Grading.—After drying the tea is graded. The trade names for the chief grades are those given originally to the Chinese teas, such as Orange Pekoe, Pekoe, Souchong, Congu, &c. Thus the unopened tip (or bud) and the first opened leaf constitute the Orange Pekoe, the next lower grade is the Pekoe, then the Souchong, &c. The grade names do not, however, necessarily represent any particular part of the plant, still less are they the names of the teas of different plants. The grading is accomplished by certain sieving, or assortment by size, together with breakers or equalisers, in which the coarse leaf is broken down to a uniform length.

Packing is done now almost exclusively by patented machines. The chests are always lined with lead sheeting, since tea is exceedingly liable to absorb moisture from the air and then rapidly becomes mouldy. It is accordingly packed while still hot.

GREEN TEA.—For many years, writes Dr. Mann, the manufacture of green tea in India may be said to have died out, except in Kangra and

Kumaon. This change was due to the greater favour shown in Europe for black tea. While the object aimed at in the preparation of black tea is to change the materials of the leaf (by fermentation of the juice), the green colour in consequence becoming brown or black, the astringency being reduced and the aroma altered in character, in the manufacture of green tea the aim is to prepare tea without any alteration taking place at all.

Fermentation is prevented.—The first operation in manufacture is always, therefore, to heat the leaf immediately it is received from the pluckers, and without any withering, so as to destroy the ferment (enzyme), and thus prevent any after-colouring of the leaf, and at the same time to bring the leaf into the soft condition required for rolling. When small quantities are dealt with, this result may be obtained by the old process of panning. The leaf is tossed on to the hot pan and moved about to prevent any portion being burned or singed. When soft enough, it is slightly rolled by the hand, then panned and again rolled, and so on till it becomes crisp. It is then dried off by the methods already described.

When large quantities have to be dealt with, machinery is used that has been recently invented, by which the panning is replaced by a steaming of the leaf under pressure and within a rotating cylinder. But the steaming must be very short, or the leaf gets boiled, and comes to resemble broken boiled cabbage, and is then useless; and yet it must be treated long enough to ensure the destruction of the ferment. About $1\frac{1}{2}$ to 2 minutes under steam pressure of 20 lb. to the square inch is generally sufficient. The excess of water is now got rid of by a centrifugal machine. The leaf is then lightly rolled as with black tea; but this must be very slight, since broken grades of green tea are worthless.

In order to obtain the full degree of green colour demanded by the trade the habit prevails in China to "face" the tea by rubbing it when finished in a hot pan with a small quantity of indigo or gypsum or other similar colouring material. In Kangra the native manufacturers use a green soapstone for that purpose. There is, however, no occasion to use any foreign colouring substance at all, since the peculiar colour desired can be produced by the ordinary process of manufacture.

The following passage from Vigne's "Travels in Kashmir &c.," 1842, vol. i. p. 265, is, I think, fully representative of the method of preparing the beverage, and may appropriately conclude these observations on green tea:—"Tea made, or rather boiled, with water, as in Europe, is called *Moguli chá*, or the tea of the Moguls, as they call the Persians. But *Tibeti chá*, or tea as made in Tibet, is a very different composition, for which the following is the recipe for a party of five or six people. A teacupful of the finest green tea is put into three pints of water, and upon this is strewed a large spoonful of soda, and all three are boiled together. About a pound of fresh butter, or *ghi*, and a pinch of salt are then placed at the bottom of the milling churn and part of the boiling contents are poured out and milled like chocolate; a little cream or milk is then added to what has remained in the saucepan, and on this the milled tea is poured and boiled again, and part of it again transferred to the churn, and so on till it is all properly milled. All that then remains to be done is to strain it through a clean cloth. Much depends upon the quality of the tea and

the manner of making it. I have nowhere drunk it so good as with Ahmed Shah. It was always made before or after a march, and on a cold morning I found it, after a little time, quite as palatable as tea made in the ordinary way, and far more nourishing. When well made it resembles chocolate in appearance, in consequence of the reddish tinge imparted to the tea by the presence of the soda, which prevents it also from cloying. *Sutu*, or the flour of roasted barley, is frequently eaten with it."

OOLONG TEA.—It would occupy far too much time to describe all the other classes of tea besides black and green. I think, however, that it may be of interest to many to have the following description of the manufacture of *Oolong* tea (which Dr. H. H. Mann has kindly furnished me with) placed on record here:—"Formosa *Oolongs* have a recognised place on the tea market, principally on account of a very characteristic and much-desired flavour. Commissioners were sent from both India and Ceylon in 1904 to ascertain the methods by which this was produced. They reported that the flavour was principally due to the particular variety of the plant grown. But that variety was not to be recommended on any other ground, as the yield was small, the plant was difficult to grow, and could only be satisfactorily propagated by layering. The manufacture was quite special in character, and in essentials was carried out as follows: On the leaf being brought into the factory at midday it is put out in the sun to be warmed, first spread thinly and then thicker, for twenty minutes to one hour. The leaf so treated is taken into a house and spread on bamboo trays in a layer about three to four inches thick. At intervals of fifteen minutes it is collected together and shaken up with the hands. With this treatment continued for two hours, a change occurs in the smell of the leaf, and a tinge of brown takes place on the softer leaf and on the edges of the others. When this discoloration has spread over the softer leaves in spots, the tea is ready for panning. This operation is carried out by keeping the leaf constantly and evenly on the move in a pan about two feet in diameter, retained at a temperature of 360° F. to 400° F., and for about ten minutes. Rolling follows, and finally firing in the small charcoal stoves used universally in tea manufacture in China and Japan. For further particulars the report of the Indian Commissioner, Mr. J. Hutchison, 'The Cultivation and Manufacture of Formosa Oolong Tea,' Calcutta, 1904, should be consulted."

It will be observed that the process of *Oolong* tea manufacture manifests nothing new. It is precisely that described by Bruce in 1839, and produced by appliances that in no respect differ from those shown by my reproduction of Bruce's original plates. It would thus seem that the peculiar flavour of the *Oolong* teas must be due to some other cause than the method of manufacture, unless it be supposed that the system, originated and perfected in the Indian plantations, has omitted some element of importance when it abandoned sun-drying and panning before rolling. It would seem, therefore, far more likely that climate, soil, and plant have more to do with the peculiar flavour of the *Oolong* teas than the particular method of manufacture.

ON SOME REMARKABLE ADAPTATIONS OF PLANTS TO INSECTS.

By Rev. Prof. G. HENSLOW, M.A., V.M.H.

[Lecture given on June 26, 1906.]

As adaptations to external conditions of all sorts occur in all parts of plants, I propose selecting a few examples of special cases in connection with insects and humming birds, taking as examples ant-domatia and the cultivation of fungi by ants, the pollination of *Salvia* and *Coryanthes* by bees, *Marcgravia* by birds, and the ovary-gall of the "wild" fig, or *Caprificus*.

ANT-DOMATIA.

The first person to notice and describe the stipular domatia of a species of ant (*Pseudomyrma bicolor*, Guer.) in the "bull's-horn thorn" acacia (*A. sphærocephala*) was T. Belt. He thus wrote:—*

"This acacia has bipinnate leaves and grows to a height of 15 or 20 feet. The curved horn-like stipules are hollow and tenanted by ants, which make a small hole for their entrance and exit near the pointed end. They also burrow through the partition that separates the two horns. Here they rear their young, and in the wet season every one of the thorns is tenanted; while hundreds of ants are to be seen running about, especially over the young leaves. If one of these be touched, or a branch shaken, they swarm out from the hollow thorns and attack the aggressor with jaws and sting. They sting severely, raising a little white lump that does not disappear in less than twenty-four hours.

"These ants form a most efficient standing army for the plant, which not only prevents the mammalia from browsing on the leaves, but delivers it from the attacks of a much more dangerous enemy—the leaf-cutting ants. For these services the ants are not only securely housed by the plant, but are provided with a bountiful supply of food; and to secure their attendance at the right time and place this food is so arranged and distributed as to effect that object with wonderful perfection. At the base of each pair of leaflets, on the midrib, is a crater-formed gland which when the leaves are young secretes a honey-like liquid. Of this the ants are very fond; and they are constantly running about from one gland to another to sip of the honey as it is secreted. But this is not all; there is a still more wonderful provision of more solid food. At the end of each of the small divisions of the compound leaf there is, when the leaf first unfolds, a little yellow fruit-like body united by a point at its base to the end of the plumule. It resembles a golden pear. When the leaf first unfolds these little 'pears' are not quite ripe, and the ants are continually employed going from one to another examining them. When an ant finds one sufficiently advanced it bites the small point of attachment; then bending down the fruit-like body, it breaks it off and bears it away

* *The Naturalist in Nicaragua*, p. 218 (1874).

in triumph to its nest. All the fruit-like bodies do not ripen at once but successively; so that the ants are kept about the young leaf for some time after it unfolds. They are about one-twelfth of an inch long, and are about one-third of the size of the ants; so that the ant bearing one away is as heavily laden as a man bearing a large bunch of plantains."*

As another instance of a domatium, that of the genus *Cecropia*,† especially the South Brazilian *C. adenopus*, may be mentioned. Dr. Schimper thus described it:—‡ "It carries a slender stem supported on short prop-roots. A few active ants are always running along the branches and petioles. If the tree be somewhat roughly shaken, then from minute holes in the stem and twigs an army of ants rushes out and savagely attacks the disturber. The species is *Azteca instabilis*, and is one of the most bellicose of ants, its sting being most irritating. The *Cecropia* provides its guests with a dwelling and food. The centre of the stem is traversed by a transversely divided cavity; this is not an adaptation to the guests. The dwelling existed before the symbiosis. The entrance is at the upper part of the internode. The axillary bud causes a slight indentation, but at the upper end this forms a roundish depression, where the tissues within are less developed, and so afford an easy entrance by boring through it.

"The ants of the *Cecropia* devote themselves in their dwellings to the tending of aphidæ; they would seldom leave this work if the foliage did not merit continued attention. The base of the petiole is covered on its dorsal surface with a brown velvety coating upon which, in uninhabited trees, ovoid whitish bodies, 2 mm. (.08 inch) long, lie quite loose. They were called Müller's corpuscles, after Fritz Müller, who discovered them. They are absolutely wanting on the surface of the pulvinus of uninhabited trees, because they are continually carried away and eaten by the ants that are always looking for them, just as in *Acacia cornigera* (*sphærocephala*). They consist, like those of that plant, of delicate parenchyma rich in proteids and oil. Having a stoma at the apex of each, they are to be regarded as metamorphosed glands. They do not, however, fulfil the functions of glands even in their early stages. Whilst normal leaf glands, with this exception, occur only on young leaves and forthwith die, the glands of *Cecropia*, converted into nutritive bodies for ants, are continually produced during the whole life of the leaf, and are continually shed when they are gorged with albuminoids.

"The assumption that the entrance-door and Müller's corpuscles represent adaptations to ants was surprisingly confirmed by the discovery near Rio de Janeiro of a species of *Cecropia* devoid, not only of the ants, but also of the entrance-door and of Müller's corpuscles as well."

Dr. Schimper describes three other domatia as occurring in the naturally hollow stems of *Ficus inæqualis* (*Moraceæ*), *Triplaris americana* (*Polygonaceæ*), and *Humboldtia laurifolia* (*Leguminosæ*), observing that while ants take advantage of the cavity, "the entrance-aperture may safely be described as an adaptation."

* Fr. Darwin has described the above structures in his paper, "On the Glandular Bodies of *Acacia sphærocephala* and *Cecropia peltata* serving as Food for Ants &c.," *Journ. Linn. Soc. Bot.* vol. xv. 1876.

† Natural order *Artocarpaceæ*, or the Breadfruit family.

‡ *Plant Geography*, p. 141.

ANTS AS CULTIVATORS OF FUNGI.

Dr. Schimper observes : *—"Ants in the temperate zones play an unimportant part in the economy of nature, but in the tropics a leading part. In tropical America the so-called leaf-cutters, or parasol-ants, of the genus *Atta*, may be reckoned as the most dangerous foes to vegetation."

The object of the ants in cutting fragments of leaves, flowers, fruits, or seeds, which they carry home, often from great distances, is to form beds for the cultivation of fungi. "The fragments are cut up at home into small pieces and kneaded soft by the feet and mandibles, so that but few cells remain unbruised." This spongy mass forms the fungus-garden. Fine mycelial threads soon interpenetrate the mass of decaying vegetable matter. The branches of the mycelium bear innumerable white bodies, not more than $\frac{1}{2}$ inch in diameter. "They spring laterally from the mycelial threads, and are termed by Möller 'kohl-rabi clumps.'" They consist of an agglomeration of short branches with globular swollen ends and very rich in protoplasmic contents. They are the most important, if not the sole food of the ants, and represent a new structure which has arisen. Möller, of Brazil, noticed how "the ants by industriously biting off the sub-aërial threads prevent the vegetable sprouting and the formation of large pileate sporophores of a purely agaric type, which Möller found to be a new species, which he named *Rozites gongylophora*." This may possibly explain the origin of the "clumps"; for M. Gallaud in his investigations upon endophytic Mycorrhiza noticed that as the mycelium penetrates through the cell-walls of the host the check received often causes the branchlet to swell into a "vesicle," apparently very like those of the kohl-rabi clumps.

Dr. Schimper adds:—"The four species of *Atta* that occur near Blumenau cultivate the same species of fungus, which is never found outside the ants' nests. We have therefore here a highly developed case of reciprocal adaptation between unlike organisms."

It must be added that, although the clumps only arise in nature under the treatment of the ants, Möller was able, in cultures in nutritive solutions, to induce the fungus to form kohl-rabi clumps, which were identical with those in the fungus-gardens, and were eaten just as greedily by the ants. "The phylogenetic starting-point of this evolution is to be sought in the tendency of the fungus to produce all kinds of swellings."

There are other genera of ants which also make fungus-gardens: one is called the hump-backed ant. The mycelium develops less perfectly formed kohl-rabi clumps, having only swollen club like forms of branches.

FLORAL ADAPTATIONS TO INSECT POLLINATION.

The adaptations of flowers may be regarded as the result of a response of the living protoplasm together with its nucleus, due to its inherent sensitiveness to external irritations, or what Darwin called "the direct action of the conditions of life."

But there is more than a mere response. The structures show in many ways remarkable "means to ends," as we should describe them

* *Op. cit.* p. 134.

in humanly invented contrivances, by means of which the plant surmounts difficulties brought about by the automatic response itself. Thus, the stimulus of insects appears to enhance the development of the corolla, so that regularly visited flowers are mostly very conspicuous. With this organ the stamens are closely correlated, petals having been originally, but metaphorically, "made out of stamens"; so that a very general result is that in such flowers they mature their pollen *before* the stigmas of the same flower are ready to receive it. Hence a difficulty arises in the flower fertilising itself, which places it at a disadvantage, for it not infrequently happens that a flower has become so closely "fitted" to one or few insects that it can set no seed without them. There are two ways by which flowers have overcome this difficulty. If abandoned by insects, they resort to self-fertilisation by modifications of the floral structures, securing a simultaneity in the maturation of the pollen and stigmas, or by the bud remaining unopened and cleistogamous.

But with conspicuous, strongly "protandrous" flowers, the method adopted, so to say, by nature is to secure intercrossing if self-pollination—the safer process—fails.

To do this, curious special adaptations are resorted to. As an example, I will first take *Salvia*, of the Labiate family. Like all irregular flowers, this is descended from a regular pentamerous flower. Reversions not infrequently occur revealing their ancestral origin. It is worth while enumerating all the points of the existing flower now in perfect adaptation to an insect. (Fig. 18.)

The calyx is in one piece to support the slender tube of the corolla and weight of the insect. It is nearly bilobed, due to an apparent *stretching* forwards. Nine additional ribs are run up the calyx to meet the strain in front and sides.

The anterior petal of the corolla is greatly enlarged to form a landing place, and the conspicuousness of the flower much enhanced. Hypertrophy having affected the anterior side, the two front stamens are greatly increased in size, while the three posterior are atrophied. The two stamens are pushed over to the posterior side, being extraordinarily modified for a well-defined purpose. The filaments are very short, but the "connective," which unites the two anther-cells, is converted into a long curved rod; the upper anther-cell bears pollen, but the lower has none. The whole swings on a pivot—the point of attachment to the filament—and forms a lever standing in a vertical plane. The short arm is below, the long one above. The style carries two stigmas, and curving forwards presents their surfaces to the front. A bee on entering thrusts its head downwards, striking the two abortive anther-cells, thereby forcing the short arm of the lever downwards and backwards; the long curved arm of the lever now comes down in front and strikes the bee on the thorax, thereby depositing pollen upon it. On entering another flower the forked stigmas strike the bee where the pollen has been deposited previously. It is by this mechanical contrivance that the *Salvia* has overcome the difficulty of never setting its own seed, by transferring the pollen from one flower to another.

The significant fact to notice in all this lies in the accumulation of coincidences in the structure of calyx, corolla, stamens, and pistil, all conspiring to secure one and the same "end" or cross-pollination, where

self-fertilisation is out of the question. There must be a common cause for all these minute adaptations taken together, and there is none more theoretically appropriate than the insect itself.

As a second instance, taken this time from the family of Orchids, *Coryanthes macrantha* affords another example of curious adaptations in all parts of the flower for securing the transference of pollen to the stigma. The labellum is so modified as to form a large bowl, suspended by the thickened curved base which is very strong, being provided with ridges containing a sweet juice, which is attractive to a large kind of humble-bee. (Fig. 19.)

The "gynostemium,"* or column, hangs vertically downwards, against the truncated end of which the front edge of the bowl is closely pressed, the strong and bent stem of the labellum forming a sort of spring which

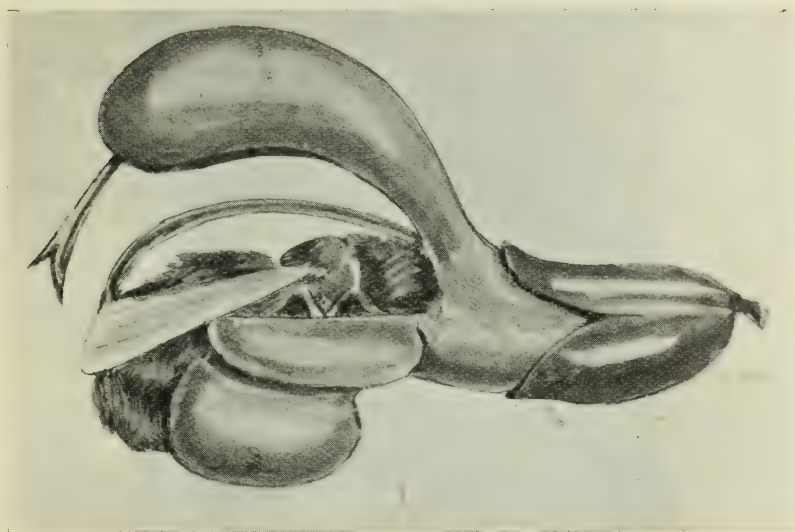


FIG 18.—A BEE BEING DUSTED WITH POLLEN IN THE BLOSSOM OF A SALVIA.†

forces the bowl upwards against it. Two little horns are borne by the gynostemium, and secrete water, which drips into the bowl, keeping the base covered with it, the superfluity escaping from two lateral depressions in front.

As soon as a flower is expanded bees arrive in great numbers. One is soon pushed into the bowl, and having its wings wetted does not attempt to fly upwards, but escapes by crawling out between the front edge of the bowl and the blunt end of the column. In so doing it carries off the two free pollen-masses, which project just over the edge in front. A continuous stream of bees has been observed forcing their way one after another all day! In order to convey the pollen to the stigma, which lies at the back of

* The column formed by style and filament combined.

† Copied from Konrad Sprengel's *Das neu entdeckte Geheimniss der Natur in Bau und Befruchtung der Blumen* (1793).

the column, the bee must pass through the same process a second time. On this occasion the pollen is left on the stigma.

The late Charles Kingsley was often struck by the appearances of ‘humour’ in nature. Had he known of the “sledge-hammer” action in

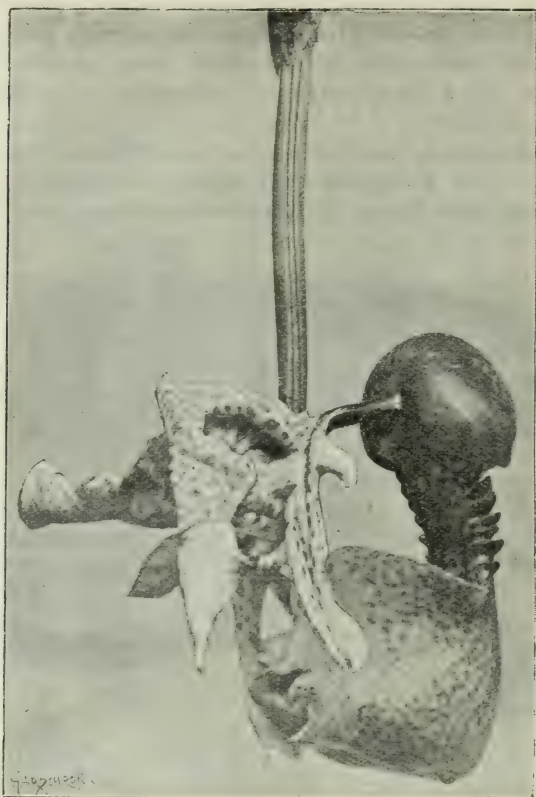


FIG. 19.—*CORYANTHES MACRANTHA*.

For description see text.

the *Salvia* and the “cold bath” of *Coryanthes* he would probably have been further convinced!

ADAPTATION TO HUMMING-BIRDS.

Besides insects, humming-birds play an important part in pollinating certain flowers in South America. Fritz Müller observed them on species of *Combretum*, *Manettia*, and *Passiflora*. Belt, too, describes them in Nicaragua as visiting *Marcgravia nepenthoides*.* “The flowers hang downwards like an inverted candelabrum. From the centre of the circle of flowers is suspended a number of pitcher like vessels, which when the flowers expand in February and March are filled with a sweetish liquid. This liquid attracts insects, and the insects, in turn, numerous insectivorous birds. The flowers are so disposed with the stamens hanging downwards

* Nat. Ord. *Ternstroemiaceæ*; *Naturalist in Nicaragua*, p. 128.

that the birds to get at the pitchers must brush against them, and thus convey the pollen from one plant to another.

"A second species of *Marcgravia* that I found in the woods around Santo Domingo has the pitchers placed close to the pedicels of the flowers, so that the birds must approach them from above; and in this species the flowers are turned upwards and the pollen is brushed off by the breasts of the birds."

In examining "pitchers" in specimens in the Museum of Natural History I found they consist entirely of hollow *axes* with an abortive bud at the apex.

THE GALL-FLOWER OF THE "WILD" FIG, OR "CAPRIFICUS."

Another instance of a perpetuated adaptation is seen in the so-called gall-flowers of the "wild" fig, or the *Caprificus* of the ancients.

This fig never produces edible fruit, as every ovary is the home of a grub of an insect known as *Blastophaga grossorum*.

The ordinary pistil of the edible fig is somewhat fusiform in shape, with two spreading stigmas; but in the gall-flower the ovary is globular and the stigmas are aborted. The summit of the ovary has a depression easily penetrated by the ovipositor of the fig insect, but the insect is unable to penetrate that of the edible fig. The peculiar form of the ovary of the gall-flower is thus now *prepared in advance* in adaptation for the reception of the egg.

METEOROLOGY IN ITS RELATION TO HORTICULTURE.

By R. H. CURTIS, F.R.Met.Soc.

[Lecture given on August 28, 1906.]

It will be unnecessary for me to do more than remind horticulturists that a very intimate connection exists between the phenomena exhibited in the growth of plants and several climatological elements whose variations it is the business of meteorologists to observe and record.

The existence of such a connection was very early recognised by the Royal Horticultural Society, and so far back as the year 1825 it gave expression to its sense of the importance of studying the relations between the two sciences by organising a series of climatological observations at Chiswick, which was continued uninterruptedly for fifty years. A break then occurred, but after a short interruption the observations were resumed with an improved equipment of instruments, the station having been reorganised by Mr. Edward Mawley, V.M.H., whose name is so well known in connection with phenological and meteorological matters, as well as in the horticultural world.

This second series had necessarily to cease when the Society removed its operations from Chiswick to Wisley; but at Wisley an excellent site has been allotted to the Meteorological Station, its instrumental equipment has been extended, and daily observations have been regularly made since the beginning of 1904.

It is satisfactory to know that these Chiswick observations have been frequently made use of by botanical physicists both in this country and on the Continent; and the Society may also congratulate itself upon the fact that it was probably the first public body in this country to organise and carry out such systematic climatological observations.

The meteorological elements which are of most direct interest to the horticulturist are:—

Solar radiation.

Temperature of the air and soil.

Humidity of the air.

Amount of moisture precipitated as rain, dew, mist, &c. Direction and force of wind.

I do not propose to attempt the impossible task of dealing with each of these elements in a single lecture, but to confine my remarks to the subject of temperature, which necessarily involves a reference to solar radiation.

First of all, let me try to make clear what it is the meteorologist observes and records.

In taking the temperature of the air, his object is to get the actual temperature of a stratum of free air at a definite height above the ground. To secure this it is essential that his thermometers shall be freely exposed to the air current, but that at the same time they shall be protected from the direct effect of both solar and terrestrial radiation.

This is done by placing the thermometers in a box or "screen" whose four sides are formed of double louvres, whilst its top is double, and its bottom is so arranged that a free passage is given to air, in or out, at the same time that the bulbs are quite protected from terrestrial radiation. This is generally known as the "Stevenson screen," after its designer, the well-known lighthouse engineer, and the father of the more famous Robert Louis Stevenson of literary renown.

In this screen are usually placed, at the height of 4 feet from the ground, a maximum and a minimum thermometer and two ordinary thermometers; the bulb of one of the ordinary thermometers is closely covered with thin muslin, which is kept constantly wet by water led to it by threads from a small reservoir at its side. The effect of the evaporation of this water from the muslin is to lower the temperature of the bulb, owing to the abstraction from it of the heat required to turn the water into vapour.

The extent to which the temperature is lowered depends, therefore, directly upon the rapidity with which evaporation goes on; and that in its turn depends of course upon the temperature and relative dryness of the air, and its consequent readiness to absorb moisture. If the air already contains as much vapour as it can hold without precipitating it as water, or if, in other words, it is "saturated," there will be no evaporation from the wet bulb and consequently no lowering of its temperature, and both it and the dry bulb will read alike.

If, on the other hand, the air happens to be very dry, and especially if at the same time it should be also warm and be moving quickly, evaporation will proceed rapidly, and so much heat will be extracted from the bulb that its temperature will fall considerably—possibly fifteen or twenty degrees—below that of the dry-bulb thermometer. Knowing the temperature of the air and the amount by which the temperature of the wet bulb is lowered by this evaporation, the actual amount of vapour in the air can be readily found by means of tables prepared for the purpose; but the usual way of describing the hygrometrical condition of the air is to give the percentage of the amount of vapour present to the amount which the air could contain if it were saturated, or, as it is termed, the "relative humidity."

The capacity of air for holding water in the form of invisible vapour depends upon its temperature; or, put in another way, the weight of vapour which a given space can contain depends directly upon the temperature of the vapour.

Into a closed glass vessel of two cubic feet area one might put about $4\frac{1}{2}$ grains of vapour if it were at the temperature of 32° without any of it becoming precipitated as water. If more than that amount were forced into the vessel, the excess would cease to exist as vapour, and would be deposited on the sides of the glass as minute particles of water.

If, however, the temperature were raised from 32° to that of an ordinary summer day—say 60° —not only would the precipitated water disappear again, but we should have to add more vapour up to a total weight of $11\frac{1}{2}$ grains before precipitation would again occur; and if the temperature were then to be raised still more to that of a hot summer's afternoon, say 80° , as much as 22 grains of vapour might be squeezed into the vessel without any deposit of water taking place.

This peculiar quality of vapour may be illustrated by a diagram in which the length of the vertical lines shows the relative weight of vapour required to saturate a space of one cubic foot at temperatures from 0° to 100° F. (Fig. 20.)

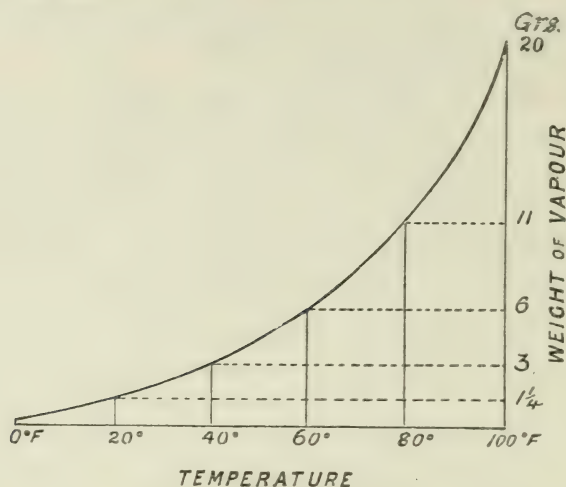


FIG. 20.

The botanical physicist requires, however, to know something about the temperature of the soil as well as that of the air, and the observations of this element which are usually made refer to the lowest temperature at the ground's surface, and the temperature at certain depths below it—generally one foot, two feet, and four feet, and occasionally also at six inches, below the surface.

For obtaining the lowest surface temperature a minimum thermometer is laid horizontally upon the ground with its bulb in contact with closely cut grass, and the reading, which is generally taken in the morning indicates the lowest temperature which plants similarly exposed have experienced since the last observation was made. It is obvious that this thermometer requires a perfectly open and unsheltered exposure, so that it may experience the full cooling effect of the radiation of heat from the earth's surface into space.

On still nights, when the sky is perfectly clear of cloud, this radiation of heat will proceed very rapidly, and the temperature of the earth's surface will fall to a point much below that which may be indicated at the same time in the closed screen four feet above the ground. One effect, familiar to everyone, of this chilling of the earth's surface is the formation of dew, which is caused by the layer of air next the ground becoming so chilled by contact with the cooled earth or grass that it is no longer able to retain in a gaseous form its present amount of vapour, and the excess becomes deposited on the grass in the form of water. A cloudy sky will check the radiation of heat, and a cloudy night is therefore not usually a dewy one; and the deposit of dew will be very slight also if the night be windy, so that the air is kept in motion and the stratum next the ground is not left in contact with it long enough for its temperature to fall very much.

The thermometers for use below the surface are specially made instruments which can be lowered to the required depths in tubes sunk in the ground ; and here, again, a perfectly open situation is indispensable so that the sun's rays may have their full effect in warming the soil by day, and terrestrial radiation may be unimpeded by night, and, indeed, that the conditions may assimilate as closely as possible to those under which plants live in the open air.

The variations in the temperature of the air and of the soil are of course primarily due to the radiation of heat from the sun, modified by the effects of rain and wind ; but it is not alone the sun's thermal effect which is of importance to the student of the conditions of plant life. The molecular changes which occur in the processes of growth are powerfully influenced by the sun's light as well as heat. And, indeed, light is essential to the perfecting of all vegetable life. It is for this reason important to know as much as possible respecting the duration and intensity of the solar radiation, which comprises both light and heat.

In the Chiswick observations to which I have referred the bulb of a maximum thermometer was covered with black wool and exposed to the sun's rays with the view of measuring their direct heating effect, and the results obtained have been used by De Candolle and others in their investigations.

The corresponding observation is made to-day by inclosing a maximum thermometer the bulb of which is coated with dull lampblack in a glass jacket which has at one end a large bulb. The jacket is exhausted of air and hermetically sealed, and the instrument is placed on a post, four feet above the ground, in a horizontal position, so that the large vacuum bulb is fully exposed to the sun. Possibly we do not get from this instrument a perfect measure of the sun's total heating effect, but its indications are probably sufficiently exact for the horticulturist ; and at any rate it has a great advantage in the matter of simplicity over the more complex and expensive apparatus occasionally employed as pyrheliometers.

But an instrument which has now come into very general use, and which yields data of great value to the botanical physicist as well as to the sanitarian and to the meteorologist, is the sunshine-recorder. In its most usual form this consists of a glass ball, or lens, which focusses the sun's rays upon a strip of card placed in a frame.

These focussed rays discolour the card or burn it completely through, according to the intensity with which the sun may be shining ; and since the trace passes along the card as the sun travels across the sky we get at once a record of the duration as well as, to a certain extent, of the intensity of the sunshine.

In some forms of the instrument photography is employed for the purpose of registration, but on the whole the photographic recorder is less satisfactory for general use than the burning recorder which I have described, and the Meteorological Office deals only with records from this form of instrument, which is known as the "Campbell-Stokes recorder," from the two men to whom the instrument in its present form is due.

So much then for the observations themselves ; now let me turn for a few minutes to their application to horticulture and agriculture.

At the outset some preliminary questions present themselves for consideration. I said just now that the temperature of the air is observed

at the height of four feet above the ground. But the great majority of plants do not attain this height; many rise but a few inches above the ground, whilst, on the other hand, the foliage of trees may be fifty feet or more above it. Now the fact that dew and hoar-frost are frequently observed on grass and low-growing plants when the temperature by the thermometer in the screen is too high for their formation shows us that the temperature near the ground is at times much lower than it is at four feet above it, and the thermometer on the grass confirms the inference. In the same way we know from direct observation that under certain conditions the air fifty feet above the ground may be warmer than it is at the level of the screen, whilst under other conditions it will be colder; and, therefore, we have to ask how far we can accept temperatures at the height named as suitable for any inquiry into the influence of temperature upon vegetation.

But notwithstanding the fact that a tree, a shrub, and an herbaceous plant growing near one another may none of them receive exactly the amount of heat which is indicated at a given moment by the thermometer in the screen, yet on the whole it is most probable that the error likely to arise from this cause would be very slight; and since for comparative purposes it is necessary to adopt a uniform height for all observers the approximate level of the eye is a convenient one to select. Probably it is only under very special conditions that these differences would be considerable, and by the aid of the grass minimum thermometer it should not be difficult in such cases to correct the screen temperature so as to meet the circumstances of any plant under consideration.

Another question of greater importance, when considering the influence of temperature upon vegetation, is to determine what temperatures are really useful to plants, and how we are to deal with the observations so as to separate those temperatures at which plant life is active from those at which it becomes dormant, and which may therefore be regarded as of no value to the plant.

The old plan was to deal exclusively with means, and it was a step in advance when means were prepared for *seasons* as well as for years and months, and when the *extremes* of temperature were considered as well as the averages. It is now a long while ago (1750) that Adanson first suggested using the sum of the daily mean temperatures for throwing light upon the relation of temperature to the development of plants.

Adanson thought the unfolding of the bud was determined by the sum of the daily means of temperature from the beginning of the year, and that view found support for a considerable time in spite of the opposition it received from some well-known botanical physicists.

Boussingault modified it considerably by calculating the temperatures, not from the commencement of the year, as Adanson had done, but from the time at which the plant under investigation began to grow; and having found the mean daily temperature for the period between the commencement of growth and its completion, he multiplied it by the number of days in the period to get the required sum of the temperature.

The conclusion at which Boussingault arrived as the result of his investigations was that the period required for the growth of a plant was inversely proportional to the mean temperature.

De Candolle further modified Boussingault's method in an important particular by omitting to consider temperatures below the freezing-point. He urged that since vegetation became dormant at those low temperatures they could have no meaning as regards the growth of a plant unless indeed they became so low as to destroy the plant altogether, and therefore he omitted from his calculations all temperatures below 32° Fahr. Further than this, he showed that for each species of plant there is a definite temperature at which its growth begins, and below which it becomes dormant; and therefore the first step towards finding the thermal constants of any plant is to settle what is that lower limit of temperature which marks the boundary between activity and dormancy.

This is not a very easy matter to determine with precision. It is certainly not the same for all plants, but for temperate latitudes it seems to be pretty generally conceded that the temperature of 42° Fahr. is a sufficiently close approximation to the dividing line for general use—at any rate for cereals and for most other farm crops.

De Candolle held that the chief factor which in our hemisphere governs the geographical extension northwards of any plant is whether or not it can obtain a certain fixed amount of heat, proper to itself, between the time when the mean temperature in spring reaches 42° and the time when in the autumn it again falls to that point. A good many physicists, especially on the Continent, have tried to determine the aggregate amount of heat required for the growth and maturation of various plants. I cannot now summarise in any detail the different methods followed and results obtained; but as regards methods it must suffice to say that, speaking generally, they have all proceeded more or less on the lines of Boussingault and of De Candolle.

In this country Dr. Gilbert, F.R.S., tried to determine it for wheat, first by combining the temperature data observed at Greenwich Observatory with the dates of harvest at Rothamsted, and also for later years by applying to the Rothamsted data the temperature values published by the Meteorological Office in its *Weekly Weather Report* where they are given in a form suggested by Sir Richard Strachey, F.R.S., as being specially adapted to the requirements of agriculture, and to which he has given the name of "day-degrees." The term "day-degree," following the analogy of the "foot-pound," signifies one degree of temperature continued throughout one entire day, and it will be best explained by the aid of a diagram (Fig. 21).

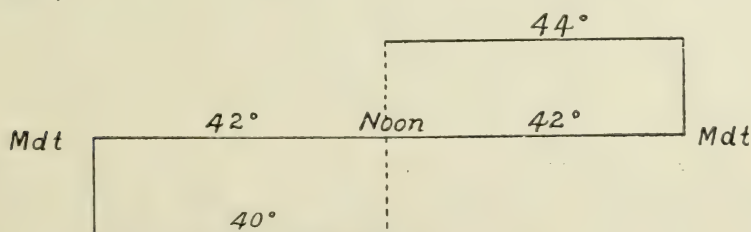


FIG. 21.

If we imagine the extremes of this figure to represent a day from mid-night to midnight, and the centre horizontal line the fixed base temperature

of 42° , then we may suppose an imaginary case in which the temperature from midnight to noon remained continuously at 40° ; at noon a sudden rise occurs to 44° , and from noon till midnight the temperature remains continuously at that point. We have therefore for twelve hours a temperature 2° below the base, and for the second twelve hours a temperature 2° above it. Now it is clear that 2° continued for twelve hours is equivalent to 1° continued for twenty-four hours, and so the conditions represented in this case would be expressed by saying that there was one day-degree below and one day-degree above the base.

If we had contented ourselves with the ordinary method we should have learned merely that the mean temperature was 42° , and that result would have given us no information whatever as to whether the temperature had varied at all from that value throughout the day.

If we take another case in which the supposed march of temperature for the day, as shown in fig. 22, represents more nearly what might really

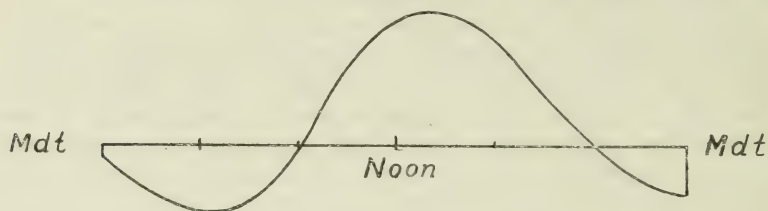


FIG. 22.

be expected to occur, we get a similar result. Here, again, the amount of temperature above the base is balanced by a corresponding amount below, and the mean is again 42° , although it is clear that for some time there would have been experienced a considerable amount of effective temperature as regards plant life.

General Strachey's formula enables one to calculate these day-degree values above and below 42° from the readings of the maximum and minimum thermometers, and such values for a large number of places throughout the British Isles—Wisley being one of them—are published every week in the *Weekly Weather Report* published by the Government Meteorological Office.

Turning now again to Gilbert's results, he got, of course, a smaller aggregate of accumulated temperature according as he moved the starting-point of his calculations further into the year, and he got different results also according to whether he used monthly means or daily means for Greenwich; and both these results were unlike what he got when he employed the accumulated temperatures averaged for the eastern and midland counties of England.

Briefly, starting from January 1 he got by using the *monthly* Greenwich means for twenty-seven years an average of $2,023^{\circ}$ Fahr. for the aggregate amount of temperature required to ripen wheat; the *daily* means for six years gave him the rather higher average of $2,189^{\circ}$ Fahr.; and by using the Meteorological Office day-degree values for the east and centre of England combined he got an average of only $1,904^{\circ}$ Fahr.

These values differ somewhat from those got by some other physicists

after correcting their results for method so as to make them fairly comparable with Gilbert's.

This correction was made by Gilbert in three cases, with the result that his value of $1,904^{\circ}$ Fahr. compared with that of $2,369^{\circ}$ Fahr. obtained by Boussingault, $1,854^{\circ}$ Fahr. obtained by Hervé-Mangon, and $2,192^{\circ}$ Fahr. obtained by Risler. These values were got from data obtained in different countries and in somewhat different ways; and although they show differences, yet they are so nearly alike as to leave little room for doubt that an approximately uniform amount of heat is required by wheat for the purpose of its growth and maturation.

It seems to me, however, that for this inquiry it is not right to deal with means such as Gilbert and the Continental physicists used, or with averages obtained from data derived from a large area of country which may present considerable climatic differences, such as Gilbert used in the later phase of his work. And, further, I think the calculation ought to extend over the entire period between sowing and harvest, because there is no doubt that a certain amount of growth proceeds under favourable conditions which may, and in our climate do, present themselves intermittently before the spring has fairly and definitely set in.

I have therefore made some calculations in which I used the day-degrees got from temperature observations actually made at Rothamsted, combined with the dates of sowing and harvest there, which were very kindly supplied to me by Mr. Hall, M.A., the Director of the Lawes Agricultural Trust.

The mean amount of accumulated temperature above 42° required for the ripening of autumn-sown wheat which I obtained from the data for twenty-eight years is $1,961$ day-degrees Fahr., and in sixteen out of the twenty-eight years dealt with there is no difference from this mean exceeding 2 per cent., although the interval between sowing and reaping has varied by as much as seven weeks, the average being 285 days.

For the present year (1905-6) I have slightly varied my plan, and have obtained the amount of temperature by integrating the continuous record of a Richard's thermograph kindly lent to me for the purpose by Dr. Shaw, F.R.S., the Director of the Meteorological Office, and which I have had in use at Warlingham, in Surrey, for the period between sowing and harvest.

Warlingham is over 600 feet above sea level, and the climatic conditions are certainly very different from those of Rothamsted; nevertheless the total amount of heat for the entire period of 282 days comprised between the sowing and harvesting of wheat is $1,927$ day-degrees, which again differs less than 2 per cent. from the average obtained from the Rothamsted data.

I cannot now deal with the effects of direct sunlight upon vegetation, which are certainly very great, nor with the effect which the temperature of the soil has upon the roots which draw their nourishment from it. The temperature of the soil is probably of secondary importance to that of the air; for it seems probable that the various parts of a plant are acted upon by heat independently, and without reference to each other. For example, portions of a plant which are led into a greenhouse will grow when other portions of the same plant left uncovered will show no signs of life, the roots common to both portions being left in the soil without artificial protection of any sort. The temperature of the soil is probably

less directly affected by variations in the temperature of the atmosphere than by rain and snow percolating into the ground. The transference of heat to the soil by conduction is a process which can proceed only very slowly, whereas cold water percolating its surface will affect its temperature very readily ; the effect of wind also in causing evaporation from this surface, and so lowering the temperature, is also no doubt very considerable.

In the same way the humidity of the air and the amount of rainfall are important factors to consider, and they ought doubtless to be combined with the temperature if we would arrive at precise results ; but the consideration of all these I must reserve for some future occasion, if I am honoured with another opportunity of bringing the subject of the relation of meteorology to the phenomena of horticulture before the Fellows of this Society.

THE EDUCATION OF THE COTTAGE AND MARKET GARDENER.

By T. S. DYMOND.

[Lecture given on September 11, 1906.]

THE greater portion of this paper is devoted to the education of the small cultivator, whether he makes the cultivation of crops his means of livelihood or only an adjunct to his regular employment—education, in fact, as carried out in the elementary school and after. On the education of those whose means and position have given them the advantage of a secondary schooling a few introductory paragraphs will suffice.

RURAL GRAMMAR SCHOOLS.

It cannot be said that our rural grammar schools have done much in the past to promote rural prosperity; indeed, so little has the curriculum been a preparation for rural life that they have rather tended to educate their pupils out of rural industry than into it. In the few cases where an “agricultural side” has been established, the attempt to give technical instruction in agriculture and horticulture at the same time as instruction in French and Latin has seldom been successful. I believe there are not more than two such schools in the country now.*

What we need, if our rural grammar schools are to afford a preparation for country pursuits, is that in *all* such schools the sciences should be taught in relation to rural surroundings. At present this is very rarely the case. In chemistry you may hear a description of the neutralising and oxidising action of lime in an obscure manufacturing process—a knowledge of which is not likely to be useful to one boy in a thousand—but no reference is made to the neutralising and oxidising action of lime upon the soil, the knowledge of which might be useful to every boy in the school; in physics, transmission of heat by convection and latent heat are very properly studied, but no one thinks of illustrating these principles by determining the temperature at the top and bottom of a slope, or that of the soil under crop and fallow. It is just as easy to teach the principles of science from examples which are familiar in the rural surroundings of the school as from those which are not, while by doing so these principles are brought home to every boy in the school because the illustrations appeal to him; and at the same time those of the boys who are to follow rural pursuits are obtaining knowledge about rural things which will be invaluable in their after-lives.

I do not think it will be found that, as a rule, practical gardening is a subject suitable for secondary schools. What is needed is a thoroughly

* The Dauntsey Agricultural School at West Lavington stands on a different plane, *all* the boys receiving an agricultural and secondary education.

practical course of the physiology of plant-life in relation to the soil. The course outlined in the Board of Education Syllabuses (Stage 1 of Subject XXIV.) is especially intended for this purpose. The work in the laboratory should be accompanied by practical experiments in the field or garden, *e.g.* on sowing seeds at different depths and at different dates, on thick and thin seeding, on sowing with large and small seeds, on variation of yield with different depths and methods of cultivation, and on increase produced by different chemical manures. The students should unite in cultivating a botanical garden, and use the vegetable garden attached to the school for studying different methods of propagation, &c. Field expeditions should be made to study soils and sub-soils and the formation of soils, and the character of the flora growing on different classes of land. The whole of this work is truly educational—far more so than much of the science now taught—and it need not for a moment be feared that in carrying it out the interests of those boys who are not to follow rural pursuits are being sacrificed.

The great difficulty in the way of introducing such work into rural secondary schools is that the science masters (generally townsmen) have never themselves learnt what abundant illustration for their science-teaching the surroundings provide. It is imperative that steps should be taken to enable them, by means of summer vacation courses at agricultural colleges, to procure a knowledge of the application of science to rural life and industry. Such a course is to be given next summer at Wye College. The County Councils might well consider the desirability of offering some inducement to the science masters in their secondary schools to attend such courses.

HORTICULTURAL COLLEGES.

With such a preparation the young men who go on from the rural grammar school to the horticultural college should make rapid progress. It is not my purpose to say anything about the excellent institutions we already have at Wye, Kingston, Reading, Leeds, Holmes Chapel, Swanley, and other places. I would only urge the importance of bringing rather more into harmony the practical and the science teaching than has been done in the past. The two do not always hang together, are not as absolutely independent as ought to be the case. It is the secret of the success of the American colleges. In these science is taught, but every scientific principle is brought to bear upon the practice of horticulture. The practice of horticulture is taught, but the mind of the student is constantly being directed to the principles underlying every operation.

THE SMALL CULTIVATOR.

The extraordinary development that has taken place during the last fifteen years in horticultural instruction is one of the most encouraging features in the recent history of education. This is due, first, to the enormous impetus given to technical education by the Local Taxation and Excise Act of 1889, with funds from which the Technical Instruction Committees began horticultural teaching; and secondly, the Act of 1902 put elementary education into the hands of County Committees which were,

in most cases, already possessed of the machinery for promoting horticultural teaching in the elementary schools. It is not, I think, too high an estimate when I say that 20,000 children in country elementary schools are now being taught gardening. Such a remarkable development in the course of four short years cannot but have an enormous influence for good or evil. Can there be any possible doubt about *the good*? Whatever may be the effect on the teaching of other subjects (and in my opinion the whole education of the children will improve with the introduction of a subject which interests them so keenly), there can be no doubt that by giving a liking for, and knowledge of, gardening (1) country life will become more profitable and more attractive; (2) the people in possessing an absorbing, healthful hobby will develop physically, intellectually, and morally; (3) a greater demand for small holdings and allotments will arise, and the number of persons who directly maintain themselves as small cultivators will be increased, all being results that must tend towards greater rural and national prosperity.

GARDENING IN ELEMENTARY SCHOOLS.

I know something of elementary education in several Continental countries as well as in Canada and the United States of America, and



FIG. 23.—AN EGG-SHELL GARDEN AS CULTIVATED BY THE YOUNGER CHILDREN IN AN AMERICAN SCHOOL.

I can say that in none of these does the cultivation of school gardens approach in excellence that in our own country. In Essex, Gloucestershire, Sussex, Oxfordshire, Staffordshire, East Suffolk, Surrey, Wilts, the West Riding of Yorkshire, wherever, in fact, a responsible officer has been appointed by the local education authority to superintend the work, the cultivation of school gardens and instruction in gardening operations could hardly be better.

But it must be remembered that technical instruction in horticulture, as in anything else, is not the purpose of an elementary school. Elementary education should prepare the way for technical instruction afterwards. With this object some form of manual work is, I believe, absolutely essential to good elementary education, for the habit of manual work must be acquired at an early age, otherwise the children when they leave school are found to possess a distaste for manual employment. The curriculum should also be designed to bring the children into touch with their surroundings, natural and industrial, by giving them an intelligent knowledge of the geographical features of the neighbourhood, of the soil and the plants that grow upon it, of the animal life, of the industries in relation to the natural features—all that is comprised in the term “nature study.” If the manual work and nature study are of such a kind that

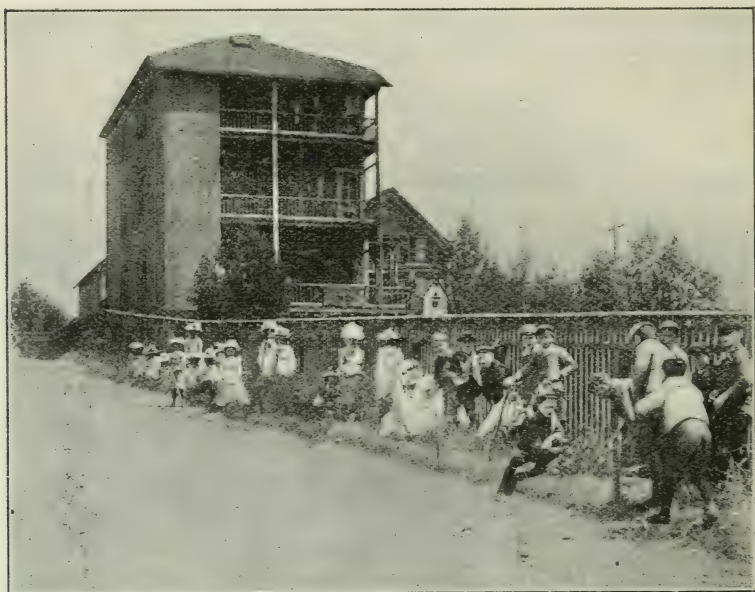


FIG. 24.—A GARDEN IN THE PLAYGROUND OF AN AMERICAN CITY SCHOOL.

the knowledge gained is of practical value in after-life so much the better; indeed it is almost essential to good teaching that the utility of subjects studied should be apparent, because it is thus that lively interest is aroused. Now gardening, when properly taught, is not only manual instruction in gardening operations, but is also the outdoor study of nature. I have already pointed out that, as manual instruction, in this country it is excellent. It is as a study of nature that it too often fails. Let me give you an illustration. I visited two school gardens in neighbouring villages in a southern county a few weeks ago. In both schools the teaching of gardening operations was as good as it could very well be, and in each case it pleased me particularly to note how the æsthetic side of gardening was being developed, each garden, with its grass walks, pergolas, and climbing plants, being a spot of beauty. But the attitude of the boys to their work was quite different.

At one school I asked how deep the soil was, what the stones were, and whether they were any good (they were chalk stones), what the name of the principal weed was (it was bindweed) and why it was so difficult to eradicate, why they sowed their beans deeper than their turnip seed? To not one of these questions could I get an intelligent reply. "Their teacher had not told them." In the other school it was quite different, and even if the boys couldn't always give a correct reply to my questions they tried to; they liked to have the questions discussed; they had learnt to use their brains. Now I don't believe in gardening which is merely telling how to do things. In the first place, the object of education is to turn out better men with more active brains, more ready to bring intelligence to bear on any problem that may meet them in their daily work—whether it is farming,

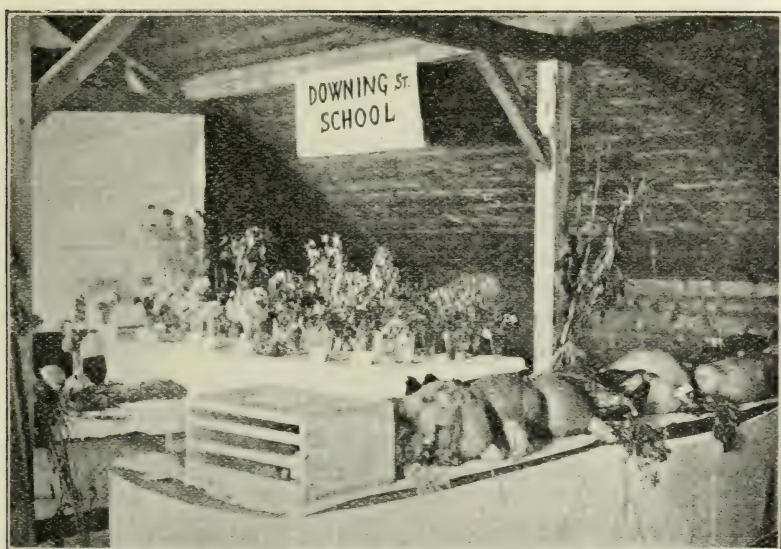


FIG. 25.—A SCHOOL-GARDEN EXHIBIT AT A COUNTRY FAIR IN AMERICA.

or gardening, or shepherding, or any other employment. In the second place, the men who have learnt to garden as they were told, to trench, to sow, to single, to hoe as their teachers showed them, without thinking for themselves, when they go to other places, with different soil, different climate, different market requirements, will find themselves failures. It has happened, indeed, that more than one of our horticultural experts—men who were appointed to a new county because of their splendid work as gardeners in the old—in attempting to carry out the same system of gardening under entirely different conditions, untrained to think about the fundamental principles underlying every operation, have come badly to grief.

This side of school gardening is the side which is unsatisfactory in this country. In America it is the reverse. There, as practical gardening, it is almost ridiculous; but as training the children to exercise their intelligence about the things that form their surroundings, and thus acquiring

a knowledge of those surroundings, natural and industrial, which will be useful to them afterwards in rural life, it is far ahead of ours. *The results are better.* The boys as they leave school may have less skill and a smaller store of knowledge, but they are more mentally alert, have greater power of adapting themselves to circumstances, are more keen to use any facilities that present themselves for further education.

I say that gardening should be conducted as an out-of-door nature-study. It should be led up to in the lower standards by work which trains powers of observation and habits of thought, *e.g.* by comparing the different forms of leaves of trees and making drawings of them ; by watching the sprouting of seeds and attempting to draw the seedlings day by day ; by studying the conditions under which seeds germinate and plants grow by means of simple experiments made by the children themselves in the school room on the effect of air, warmth, light, moisture, &c. ; and by tending growing plants in the school room or garden. When the boys are old enough to begin systematic gardening the school nature-study work should have a more direct economic bearing : *e.g.* collecting the common weeds from field, allotment, and garden, studying the time of seeding of the annuals and the root systems of the perennials with a view to learning the reasons for their abundance and the best means of eradication ; collecting garden seeds—one boy of the genus *Brassica* and allied genera, another boy the leguminous seeds, and so on—and testing samples of garden seeds for purity and germination ; studying the life-history of insect pests of the garden, *e.g.* wireworm, cockchafer, crane-fly, and winter moth ; sharing in the management of bees ; keeping a calendar for recording meteorological observations and garden operations ; studying the differences between the soils of the locality, the depth of each soil, the nature of the subsoil, the temperature of each soil, and the rate of percolation of water through each soil, and correlating with these observations the character, luxuriance, and forwardness of the vegetation.

All this work must be done by the boys themselves, and the boys must learn from their own observations, the part of the teacher being rather to direct than to instruct. Ready-prepared collections and ready-made diagrams are much better absent, not but what they may be useful, but because their use is so often abused. Books should be provided and their use in every way encouraged, but for reference rather than for learning from. In order that the whole curriculum may gain in interest, the gardening should be correlated with other school subjects. For example, before the year's work begins, each boy, as a drawing exercise, should make a scale drawing of his plot, with the plan of cropping. As exercises in arithmetic he should measure out his distances and weigh his produce, and calculate from the quantity of seed he uses—for example, in two rows of peas $3\frac{1}{2}$ yards long and 2 feet apart—how much will be required per acre. He should keep a rough diary of the operations, and afterwards write an account of the cultivation of each crop as an exercise in composition. Lastly, he should keep an account of expenses : total these up at the end of the season against the value of the produce as an exercise in bookkeeping.

About the system of cropping I have nothing to say. I am a believer

in a separate plot for each boy, or for two boys, a senior and a junior, because there is then the responsibility, the keen competition, the gratification of success, the lasting evidence of neglect, carelessness, or mistakes. The one argument in favour of a common plot, that a greater variety of vegetables can be grown, I care nothing for. If we have secured the boy's interest in gardening, and his intelligence to bear upon it, when he leaves school at twelve or thirteen he will not be too old to learn to grow vegetables other than he has been taught in school. It is, of course, strongly to be recommended that a separate fruit plot should be included in the garden. I also urge that every boy should have a part of his plot to grow what he likes upon, or perhaps a flower border upon which he can exercise his own individuality.

THE TEACHERS.

There can be no doubt that for work such as I have outlined the elementary school teacher is by far the best teacher of gardening in the elementary school. Several of the counties have recognised this and have established Saturday classes and summer courses of horticulture for their teachers, and the Royal Horticultural Society has done a most useful work in establishing a teachers' examination in horticulture, the certificate being recognised in Oxfordshire, Essex, and, I think, some other counties as qualifying the candidate as a teacher of school gardening. Of course examination is not a perfect test of a teacher's qualifications, because his fitness to undertake the work outlined more depends upon his attitude of mind to nature, his willingness to let his pupils learn as far as possible for themselves, and to assume the position of a student with his students, than upon knowledge upon which he can pass an examination. That is a matter of training, not examination. We have to try to induce the county instructors to base their teaching of the teachers on underlying principles, and, what is even more important, in the training of the teachers in pupil-teacher centres and training colleges to give that sort of training which will prepare them afterwards to take up horticulture in the right spirit. The Society will be glad to learn that the Board of Education have introduced into the training college regulations a course of rural science (including practical gardening) which is intended as a direct preparation for this work in rural schools.

EVENING SCHOOLS.

We have now to consider the further education of the small cultivator after his elementary school days are over. I have no hesitation in saying that, in spite of the growth of gardening in the day school, there is still room for gardening in the evening school. The plots should be larger, the vegetables grown more extensive in variety; a greater share of attention should be paid to fruit, and the instruction should be more technical in its character and given by gardeners (whether professional or scholastic) of proved repute. That some form of continuation school is necessary for boys whose regular schooling ends at twelve or thirteen is obvious, and gardening has the advantage that round it hang so many subjects that are important that the lads should study during the winter

evenings. Such subjects are (1) either rural science or horticulture, the rural science consisting of the study of elementary chemistry, physics,

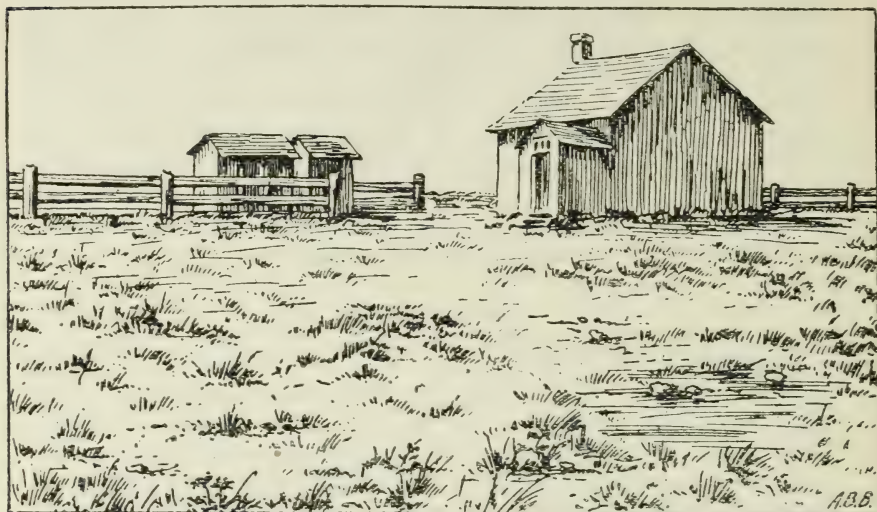


FIG. 26.—A RURAL SCHOOL IN AMERICA BEFORE HORTICULTURAL IMPROVEMENTS.

botany, entomology, &c. in their application to agriculture and horticulture; the horticulture, of lessons on horticultural practice; (2) book-

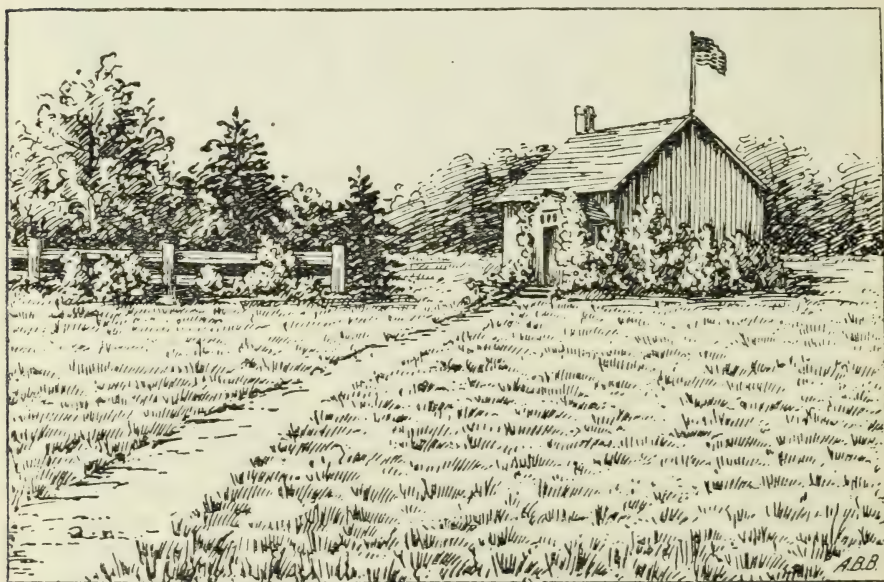


FIG. 27.—A RURAL SCHOOL IN AMERICA AFTER HORTICULTURAL IMPROVEMENTS.

keeping and garden arithmetic; (3) basket-making or woodwork and carpentry suitable for small cultivators. In addition to these one would always like to see some subject of general literary interest introduced.

A subject which needs far greater attention is "rural economics," dealing with the principles of co-operation (for purchase and sale), markets and marketing, credit banks, &c. Evening schools have very greatly diminished in many counties during the past four years, for it was found that, as a rule, their work went little beyond the three R's. We need to introduce the three R's into the evening schools, but this should be done incidentally in the study of subjects of technical and industrial importance.

OTHER MEANS OF FURTHER EDUCATION.

There are several other means of spreading a knowledge of and an enthusiasm for horticulture among small cultivators beyond those which have been alluded to. The model allotments in Oxfordshire, for example, have done good work in the past, and have been the means of introducing an altogether better quality of produce. The educational gardens in the West Riding of Yorkshire—gardens worked conjointly by the members of the garden under the direction of the county instructor—have been the means of introducing gardening into one of the blackest colliery districts and giving a humanising and intellectual interest to men whose surroundings could otherwise hardly fail to be degrading. Then the horticultural societies of small cultivators which exist in some parts of the country, by creating enthusiasm and competition among their members, do much to foster a desire for improvement. Lastly, the local flower and vegetable shows, of which I suppose many hundreds must have been held during August in all parts of the country, are having the same useful purpose. The one held at Broughton Castle this year, at which the Gordon Lennox Challenge Cup was competed for, was memorable to me, not only for the excellence of the allotment-grown produce, but for the keenness of the members of the competing societies of allotment holders.

HIGHER RURAL SCHOOLS.

Lastly, I want to say a few words as to the further education of lads of the class whose parents can afford to give them something more than an elementary school education, and who are destined to become market gardeners on a larger scale, or superior professional gardeners. It is for lads of this class that higher elementary schools are being established, and what we want is that in rural districts these schools shall include among other practical rural subjects, horticulture as a prominent subject in the curriculum. The best example of such a school is that established ten years ago by the Countess of Warwick at Bigods, near Dunmow. The pupils (boys and girls) have none of them had more than an elementary schooling, and they receive an education which almost ranks with that of a secondary school except that instruction in Latin is replaced by outdoor work in the orchard, the garden, and the experimental field for the boys, and by cooking &c. for the girls. The school is worthy of strong support, and I wish the members of this Society could see the excellent horticultural work that is being done there.

But besides higher elementary schools in rural districts we badly need an increase in the number of schools which give short courses of

instruction in horticulture to lads and young men of the type to which I am alluding. We have the County School of Horticulture at Chelmsford, which, begun by Mr. David Houston under the Essex Education Committee, has now been in successful existence for twelve years: a school in which instruction in the practice of horticulture based on a study of plant physiology is given by means of three-week courses in each of the four seasons of the year; we have the Basing Farm School in which instruction is given in gardening, farming, and dairying by means of short courses which occupy the winter months; and we have short courses of a similar kind given in one or two of the agricultural colleges. But the provision of such courses is totally inadequate to the needs of the country. Perhaps the most hopeful line to take would be to endeavour to secure some of the numerous charities which were originally intended for the education and apprenticeship of poor boys, and with them to establish schools of practical market gardening, consisting of market gardens conducted as business concerns and cultivated by the pupils of the school.

THE WIVES.

In all considerations of the education of the small cultivator there is one factor in his success which must not be lost sight of—his wife. It is upon her ability to cook the food, preserve the fruit, milk the cow, churn the butter, cure the bacon, and keep the place sweet and attractive with flowers that his success largely depends. But the education of the small cultivator's wife, while equally important with that of the cultivator himself, is outside the scope of this address.

At the conclusion of the address a series of slides were shown illustrating gardening and nature study in American schools, of which five are reproduced as illustrations of this paper.

[We understand that fig. 23 was taken from the "Cornell Nature Study Leaflets," figs. 24 and 25 from the "Nature Study Review," and figs. 26 and 27 from the U.S. Agri. Dept. Farmers' Bulletin, No. 218.]

PERFUMES: THEIR SOURCE AND EXTRACTION.

By JOHN C. UMNEY, F.C.S.

[Lecture given on September 25, 1906.]

EARLY HISTORY.

PERFUMES have been used from the very earliest times, but in the first instance they appear to have been used in connection with religious ceremonies. There are very ancient references to the use of perfumes, and the presentation of an alabaster box of perfume by Cambyses, son of Cyrus, to a prince of Ethiopia is recorded in Herodotus (about 430 B.C.). There is also recorded the fact that the Scythians made a perfumed vapour-bath by burning hemp seeds upon red-hot stones.

Scriptural allusions are numerous, amongst them being a reference in Exod. xxx. 23-38 to perfumes as an incense and ointment in the services of the Tabernacle, while in the Book of Daniel (Dan. ii. 46) the practice of fumigating rooms and the sprinkling of guests with rose water, as a compliment, is also mentioned.

There are other references to the use of perfumes, more especially to counteract offensive smells in hot climates. All such perfumes, however, appear to have been derived from resins and gum resins, and not to have been the products of flowers.

It might, perhaps, be well to mention, incidentally, that the aloe of the Bible is not the medicinal aloe, but the lign aloe, a resinous wood with a very powerful scent.

Neither must it be supposed that all the Scriptural references to spices imply those having an agreeable odour, &c. There is every reason to suppose that the reference in many instances to the "carrying of spices" is to the gum known as tragacanth.

A great many allusions to perfumes will be familiar to you in the works of Shakespeare—interesting, perhaps, because the majority of them are rather to animal perfumes than to those derived from flowers. There can be no question that during the Elizabethan period, and even later, heavy clinging perfumes were in fashion, which are now practically discarded.

The many references to civet—(see "Much Ado about Nothing," act iii. scene ii., "He rubs himself with civet; can you smell him out by that?" "As You Like It," act iii., scene ii., where Touchstone says, "Learn of the wise and perpend; Civet is of a baser birth than tar; the very uncleanly flux of a cat")—show that taste in perfumes differed very considerably. Now, I think no one would be likely to say, as King Lear does (act iv. scene vi.), "Give me an ounce of civet, good apothecary, to sweeten my imagination."

That the delicate perfume of the violet was well appreciated is shown by the pretty reference in "King John" (act iv. scene ii.): "To throw a perfume on the violet . . . is wasteful and ridiculous excess"—an opinion probably endorsed by many here to-day.

THE INTRODUCTION OF THE PERFUMERY INDUSTRY INTO EUROPE.

The use of perfumes appears to have gradually extended westward through the Greeks and the Romans, and eventually to have been intro-

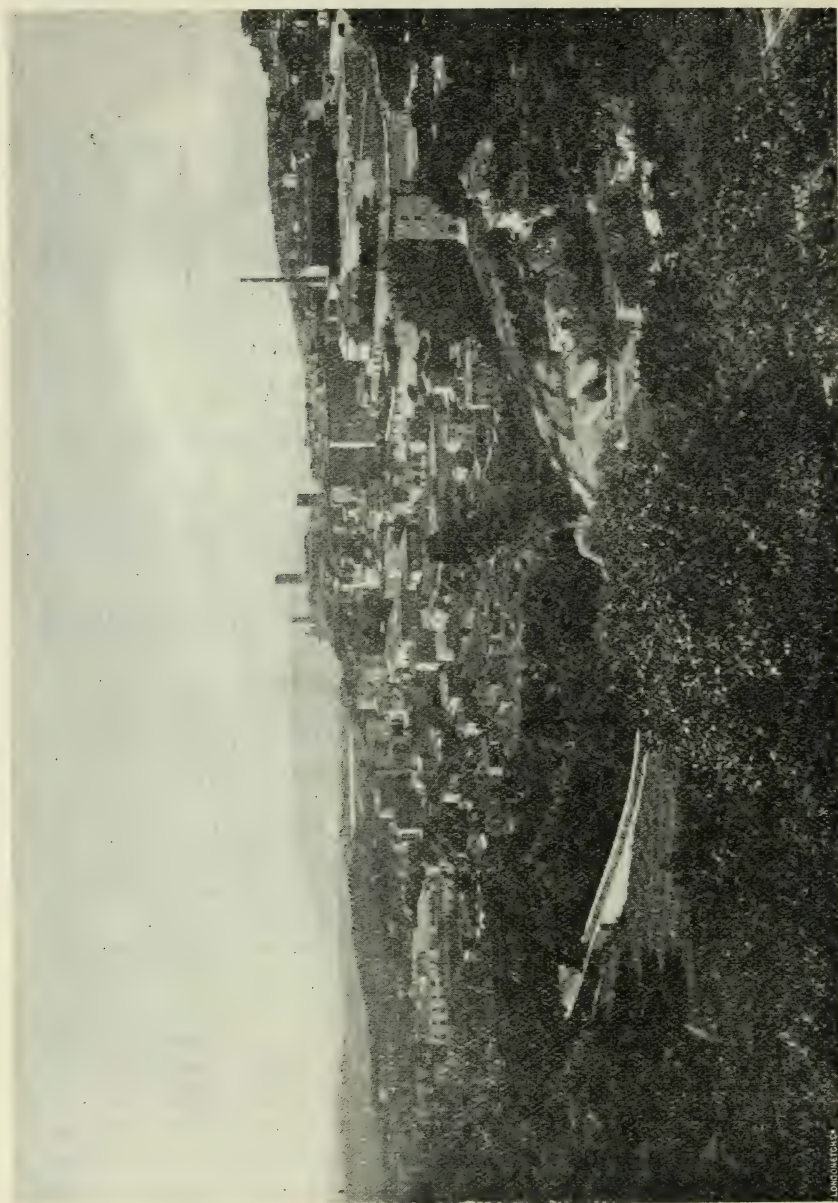


FIG. 28.—GRASSE.

duced into Italy. The cultivation of flowers in Europe for this purpose seems to have been, in the first instance, principally carried out in the districts round Florence; but probably, the need arising for a more congenial

climate and better conditions, it was transferred to the French Riviera, principally to Cannes and Grasse.

The town of Grasse (fig. 23), which is the centre of this industry and faces due south, is beautifully situated, and the place that was once called "a small village near Cannes" is now one of the most important places in the Riviera.

It has been stated that Grasse owes its elevated situation to the depredations of the Moors on the sea coast, which drove the inhabitants to seek a position inland. Anyhow it is a matter of history, that 700 years ago it was a tiny republic, and had the honour of being in alliance with Genoa.

CLASSIFICATION OF FLOWERS FOR PERFUMERY.

The flowers which are used may be divided into two classes:—

1. Those, like the rose and orange, which contain their perfume practically quite complete, and which can be extracted by maceration or distillation.

2. Flowers, like jasmine and tuberose, which contain only an insignificant amount of perfume, which they continue to develop and emit.

For the latter it will be obvious that a process which preserves the life of the flower, and extracts the perfume emitted, is the one best adapted. Passy has shown by actual proof that, operating on 1,000 kilos. (2,200 lb.) of freshly plucked jasmine blossoms, only 178 grammes ($6\frac{1}{4}$ oz.) of essential oil was obtained by distillation, 194 grammes (7 oz.) by a process of extraction to which I shall shortly refer, while by enfleurage 1,784 grammes (4 lb.) of oil was obtained from the fat used for the enfleurage, 195 grammes (7 oz.) remaining in the blossoms. Indeed these experiments would seem to show that nine times as much oil of jasmine is produced as is contained in the first instance in the plucked petals.

ELABORATION OF PERFUMES IN PLANTS.

A very complete series of experiments has been conducted by Charabot with regard to the elaboration of perfumes in plants; and although in this paper it is not possible to give details of these experiments some reference to them is certainly not out of place.

Charabot's observations have been made upon the effect of advancing vegetation on the oils of peppermint and basil. There appears to be no doubt that the essential oil is produced in the chlorophyll-bearing parts, and that, as a rule, essential oil derived from those chlorophyll-bearing parts is richer in esters (usually the soft odorous constituents of essential oils), and becomes richer as vegetation advances.

Suppression of inflorescence was found by him to cause an accumulation of the oil in the green parts. The flowers as they develop become richer in water, the petals containing a higher proportion of water than the rest of the organs. The actual amount of volatile acidity increases in a flower during its blooming, but it actually diminishes in percentage owing to the increase of water. During the fuller development of the flower the essential oil becomes richer in esters and in alcohols.

In the case of the basil plant the essential oil is formed mostly in the green parts before the period of flowering. It accumulates particularly in the inflorescence, and there is a marked decrease in the



FIG. 29.—GATHERING JASMINE.

percentage of essential oil in the green parts during the process of flowering.

Charabot, in his study of basil oil, has determined that during the period which precedes the appearance of the first inflorescence an essential

oil is formed which is relatively soluble, that is, it is rich in terpenes, and poor in the body which gives it its odour, known as estragol, while, after the first inflorescence, the oil is richer in estragol and poorer in

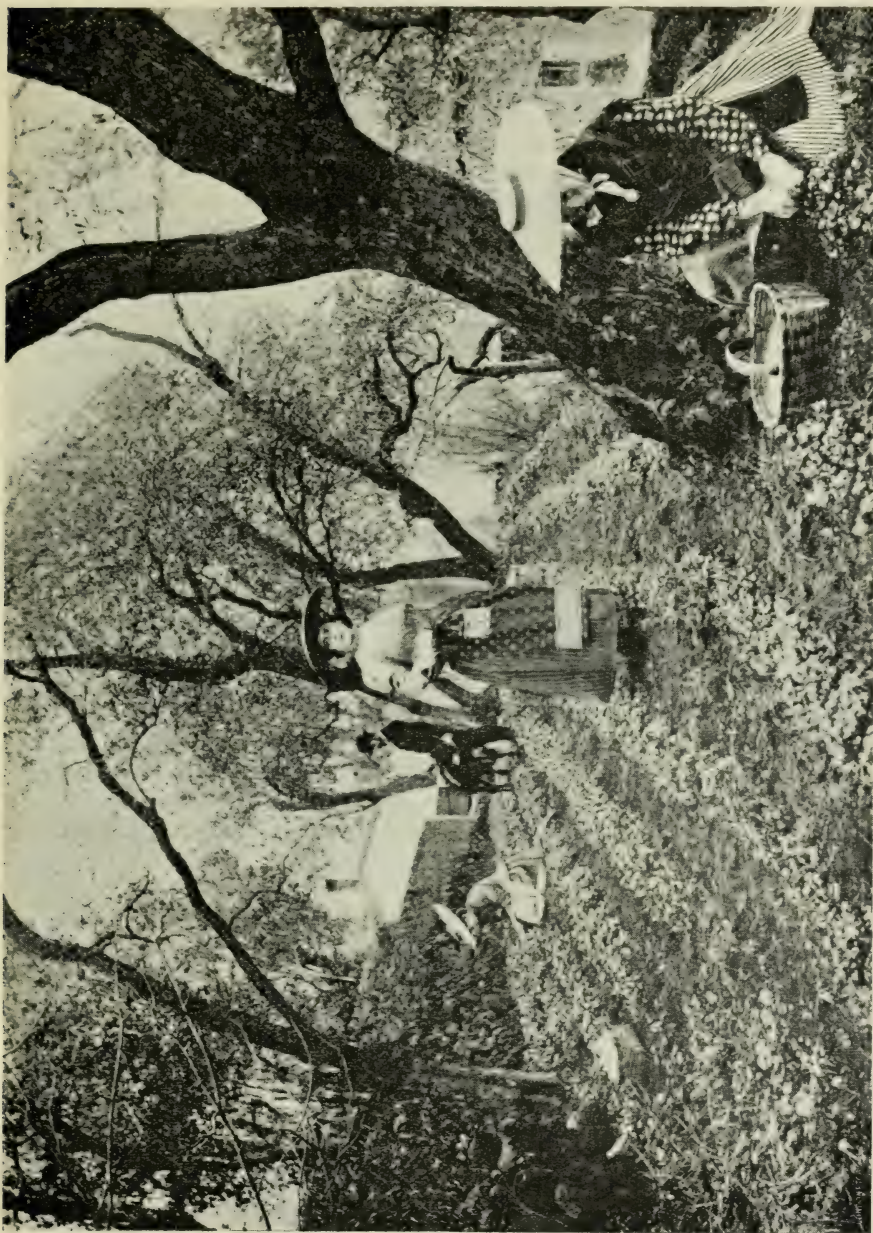


FIG. 30.—GATHERING VIOLETS AT GRASSE.

terpenes. There is no question that sunlight favours the formation of terpene compounds, and it may be possible before very long, by regulation to some extent of the sunlight, and also by the addition of certain

chemicals to the ground, to effect modifications in the characters of the essential oils.

It has been established that the peppermint plant, cultivated in soil to which sodium chloride or sodium nitrate has been added, yields an oil richer in ester than one cultivated without such addition.

PROCESSES OF EXTRACTION.

The only method used by the ancients for the extraction of odours from plants was that of maceration of the petals and the plant containing the volatile oil in vegetable oil. After clarification, the resulting ointment was used for the anointing of the body, or for such other purpose as the perfume was required. At a later date, when the process of distillation was introduced into Europe (probably about 1100 A.D.), it was gradually extended to the distillation of plants for their oils.

In some instances recourse was had to the process of fermentation before distillation. This was done with juniper berries, sage, wormwood, and other herbs, and in some instances the plant was even moistened with alcohol before distillation. Of course a larger yield of so-called oil was obtained, but apparently the distiller did not recognise that the oil was diluted with alcohol.

The volatile oil industry seems to have developed from very small beginnings in the South of France in the fifteenth and sixteenth centuries, with the distillation of lavender and rosemary oils, and the blending of these and other oils to produce agreeable fragrant mixtures considerably stimulated the industry. Perhaps the real perfume industry may be said to have had its origin in the preparation of Hungarian water in the sixteenth century, which was an alcoholic distillate from fresh rosemary. In the seventeenth century an alcoholic distillate made from balm and lavender was known as Karmelite Geist. It was in 1725 than Johann Maria Farina introduced his famous Eau-de-Cologne.

The following are the processes now used for the extraction of perfume from flowers :—

1. Distillation by heat ;—fire or steam.
2. Extraction from the petals or leaves by placing them on cold fats (*enfleurage*) ; a process only used for the most delicate flowers, such as tuberose and jasmine.
3. Extraction by warm effusion on fat ; a process used for violets, roses, &c.
4. Extraction by various volatile solvents such as alcohol, petroleum-ether, acetone, &c.
5. Expression as used upon the skins of fruit (lemon, bergamot, orange, &c.).

DISTILLATION.

In connection with the first process, one cannot do better than use as an illustration the method of distillation of lavender flowers as resorted to on the hillsides in the districts of Grasse, Mitcham, and Ampthill respectively.

French lavender grows luxuriantly in the mountainous districts of Southern France, &c. As the lavender blossoms cannot be transported, the distillation is carried on as near as possible to the place of

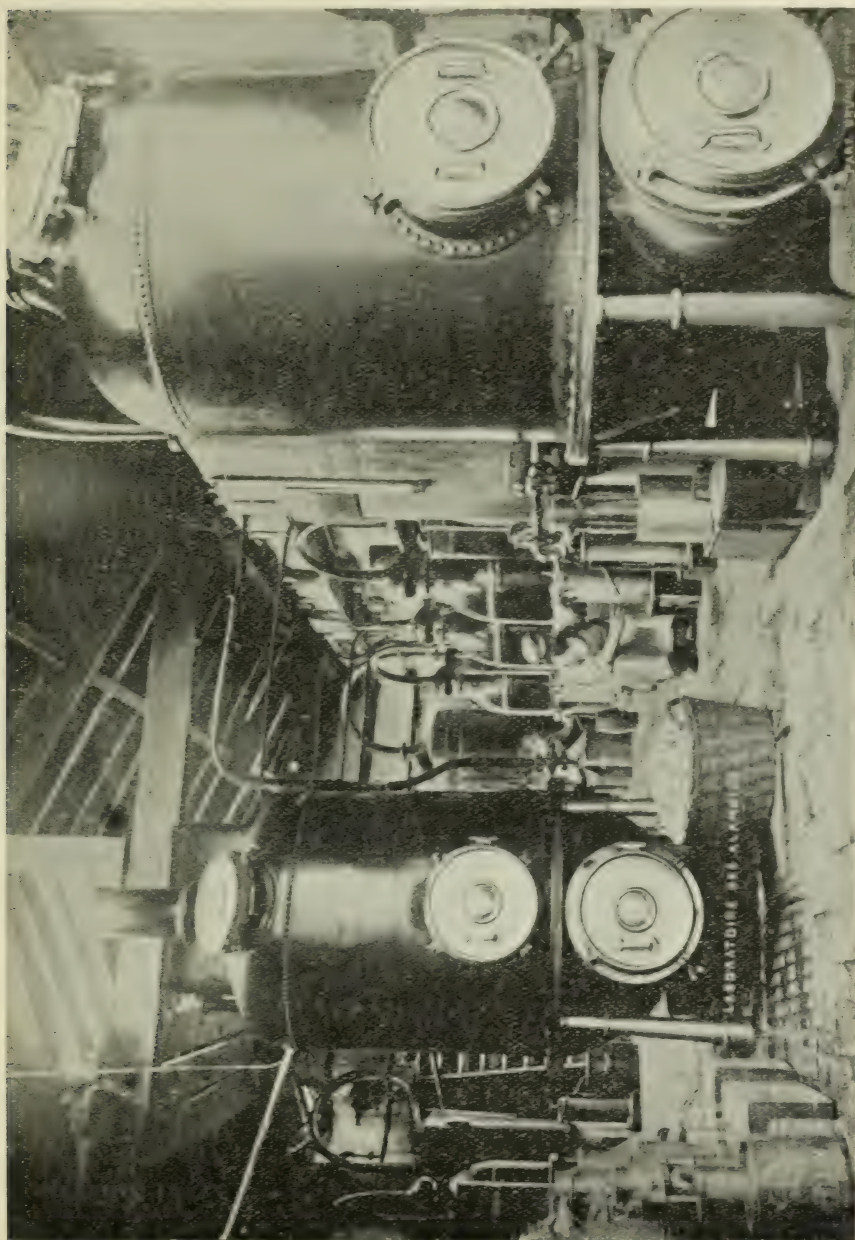


FIG. 31.—DISTILLERY : GRASSE.

collection, as a general rule, in portable stills. At the beginning of the flowering period the distillers take their apparatus to the mountains on mules. In the neighbourhood of a spring the still is erected and heated

with wood, which is abundant. The collection is always begun in the lower regions, where the lavender blooms first. The available material is collected, and distilled in the neighbourhood of collection; the apparatus is then carried to a higher point. In this way distillation proceeds until the end of September, when the blossoms at the greater altitudes are distilled.

The stills are comparatively small—not capable of holding more, as a rule, than fifty gallons, and the resulting oils are brought by the peasants and their agents to the larger distillers and merchants in Grasse for valuation and purchase.

The distillation of lavender in England is carried out under entirely different circumstances, large stills, in which as much as 12 to 13 cwt. of lavender flowers can be distilled at one time, being used.

The lavender crop is one that varies very greatly according to weather. Taking this year (1906), for example, Messrs. Stafford Allen & Sons, of Ampthill (fig. 32), inform me that the exceptional sunshine has acted very favourably, and that the yield is a high one. From my own observations, and from others, I am able to say that the yield recorded in text-books is a misleading one. It is only on very rare occasions that it reaches 1 per cent., and as an average of the past eight seasons 0·65 would be a fair one, which is less than the yield this year. I may add, that owing to the unprofitable character of the industry practically all the ground that was devoted to it in the Mitcham district is now cultivated for other purposes.

The process for the distillation of attar of rose differs really very little in principle from that already referred to, but the industry is so important, that perhaps some slight reference should be made to it, and conveniently at this point.

Practically the whole of the distillation of attar of rose is carried out in the districts of Bulgaria, just above the ancient province of Roumelia.

The rose, of which two varieties are cultivated—the white and the red—appears to flourish there, as a result of certain climatic conditions, in a manner that it does not in any other district, and attempts to introduce the growth of roses in the Riviera and other parts of Europe have so far not met with any marked degree of success.

A whole lecture could be devoted to an account of the cultivation, distillation, &c. of attar of rose. The charge for each still consists, as a rule, of 10 kilogrammes of flowers (22 lb.) to 75 litres of water (16 gallons), taking the total capacity of the still as 110 litres (24 gallons). The yield of oil varies considerably, but of absolutely pure attar of rose the yield is not more than 0·03 to 0·04 per cent. of the flowers.

Full details of the attar of rose industry are given in the interesting publication of Cristoff entitled "*L'Industrie des Roses en Bulgarie*."

I do not here deal with the process of rectification of essential oils carried out in some instances with steam, but to the more effective and now frequently used vacuum stills. These stills are used for the elimination of inodorous constituents of volatile oils from the odorous ones.

ENFLEURAGE (COLD).

The second process with which we have to deal is, perhaps, that of the greatest interest. I have already divided flowers into two classes

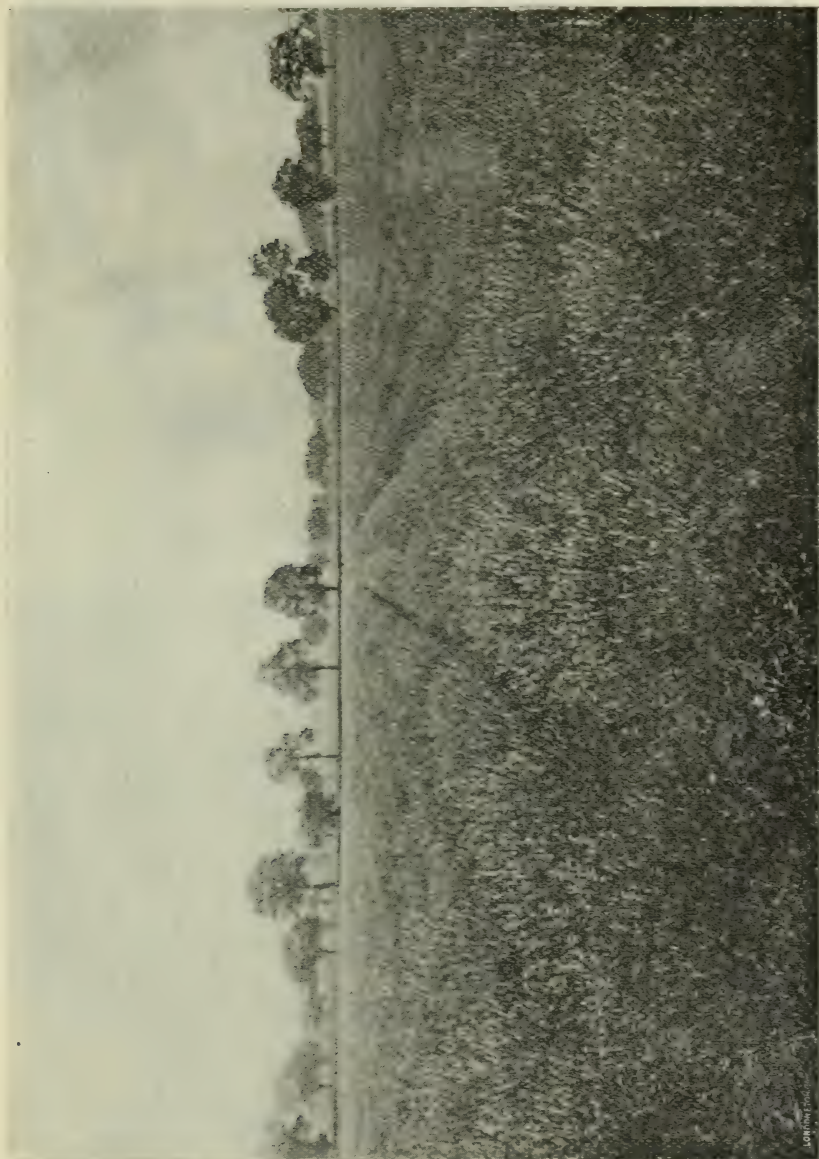


FIG. 32.—A LAVENDER FIELD AT AMPTHILL.

and referred to the fact that those of the second class emit a perfume continuously for a long time after they have been plucked. It is for these flowers that this process is employed.

The process consists in spreading upon glass trays framed with wood about three inches deep a layer of specially prepared fat about

half an inch thick. Upon these are then sprinkled or carefully placed the petals of the flowers, the odour of which it is desired to extract. The flowers are renewed from day to day, and the trays piled on racks so as

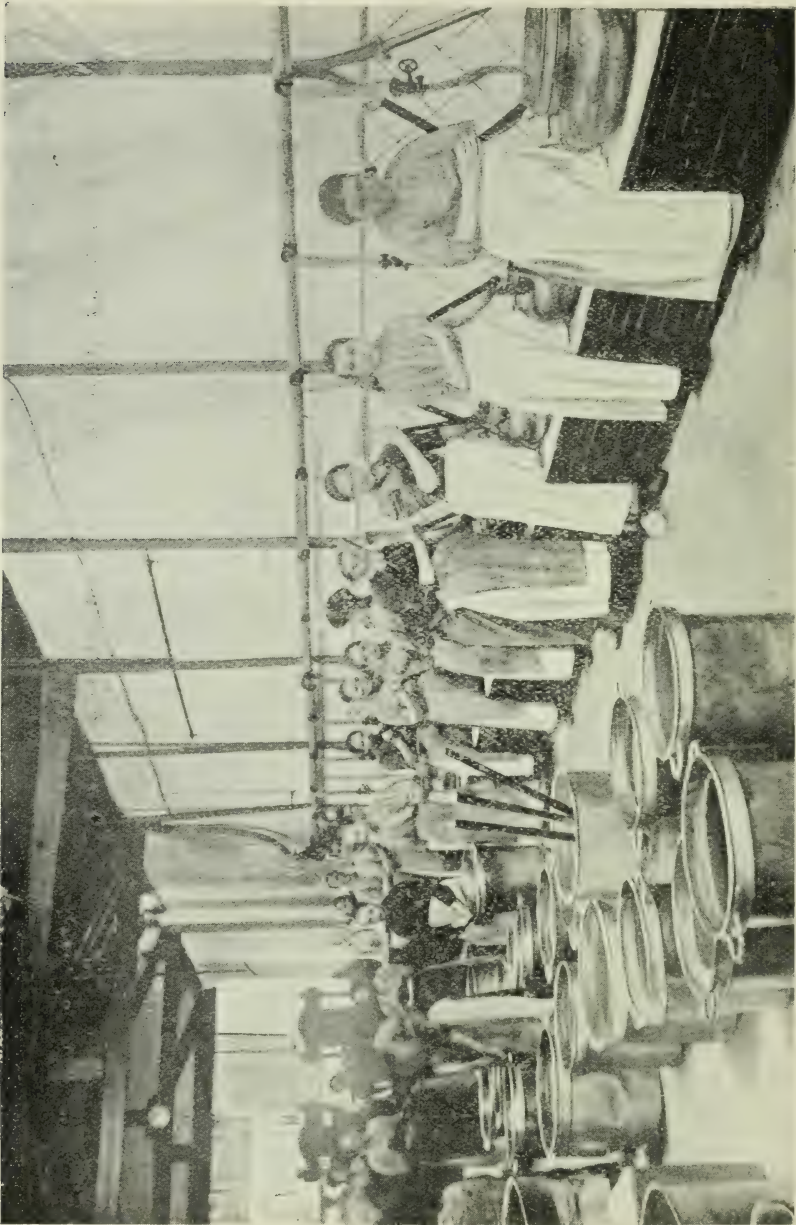


FIG. 33.—EXTRACTING PERFUMES FROM FLOWERS WITH WARM FAT IN WATER BATHS.

to prevent any evaporation. In this way the fat rapidly absorbs both the odour existing in the flowers and that subsequently developed, and the fat is finally freed from the remaining petals by melting it at a very low temperature and straining. The fat that is employed for the purpose

needs naturally very careful selection. It is, as a rule, a mixture of pork and beef fat, most carefully purified, the proportions of these two fats being varied according to the nature of the flowers for which they are employed.

MACERATION (WARM).

Process No. 3—namely, extraction by a fat maceration at a fair temperature—is the one that is resorted to on the largest scale in the factories at Grasse. Nothing, I conceive, is more astounding to the visitor to one of the large factories than to walk over beds of plucked violets ready to be placed in the warm melted fat in which they are infused. Flowers are added to the melted fat from time to time, and expression of the fat from the flowers is carried out by means of a series of hydraulic presses. The macerating vessels, as will be seen by the illustration (fig. 33), consist of a series of copper vessels enclosed in jacketed steam pans, which can, of course, be heated to any desired temperature, and the heat maintained or diminished as may be required.

EXTRACTION WITH VOLATILE SOLVENT.

More recently, the fourth process referred to has been introduced, and the extraction by volatile solvents is being employed at some of the more up-to-date of the factories of Grasse.

Petroleum-ether is an extremely powerful solvent of oily matter, and, being highly volatile, can, under certain conditions, be dissipated from the body that it has extracted without the necessity of raising the body to such a temperature as will cause decomposition of the most delicate odorous bodies.

I might also refer to extraction by alcohol in connection with the removal of the odour from the fats (pomades) rather than from the actual extraction of flowers direct by alcohol. Alcohol is rarely employed for direct extraction, as the boiling-point is a little too high for convenient dissipation. Fig. 34 is an illustration of the ingenious form of machinery used for the extraction of the odour from pomades. The mechanism is simple, yet in every sense effective, and the arrangements made for conducting the process in well-clasped cylinders enable the process to be carried out with very little loss of alcohol—a not unimportant consideration in this country, where the alcohol used for perfumery is worth 19s. per gallon, of which practically 18s. is duty.

EXPRESSION FROM PEELS &C.

The process of expression described as No. 5 is that used for the obtaining of the volatile oil from the peel of lemon, orange, bergamot, and other species of Citrus.

Whoever has paid a visit to the famous and romantic island of Sicily could not but admire the vast orchards of lemon trees stretching all the way from Syracuse to Messina, and thence along the north shore to Palermo, covering miles and miles of territory. In fact these extensive groves of lemon trees represent one of the principal factors of wealth of this fortunate island.

The orchards are well cultivated, and all contain a very ingenious system of irrigation which serves to regulate the production of the trees

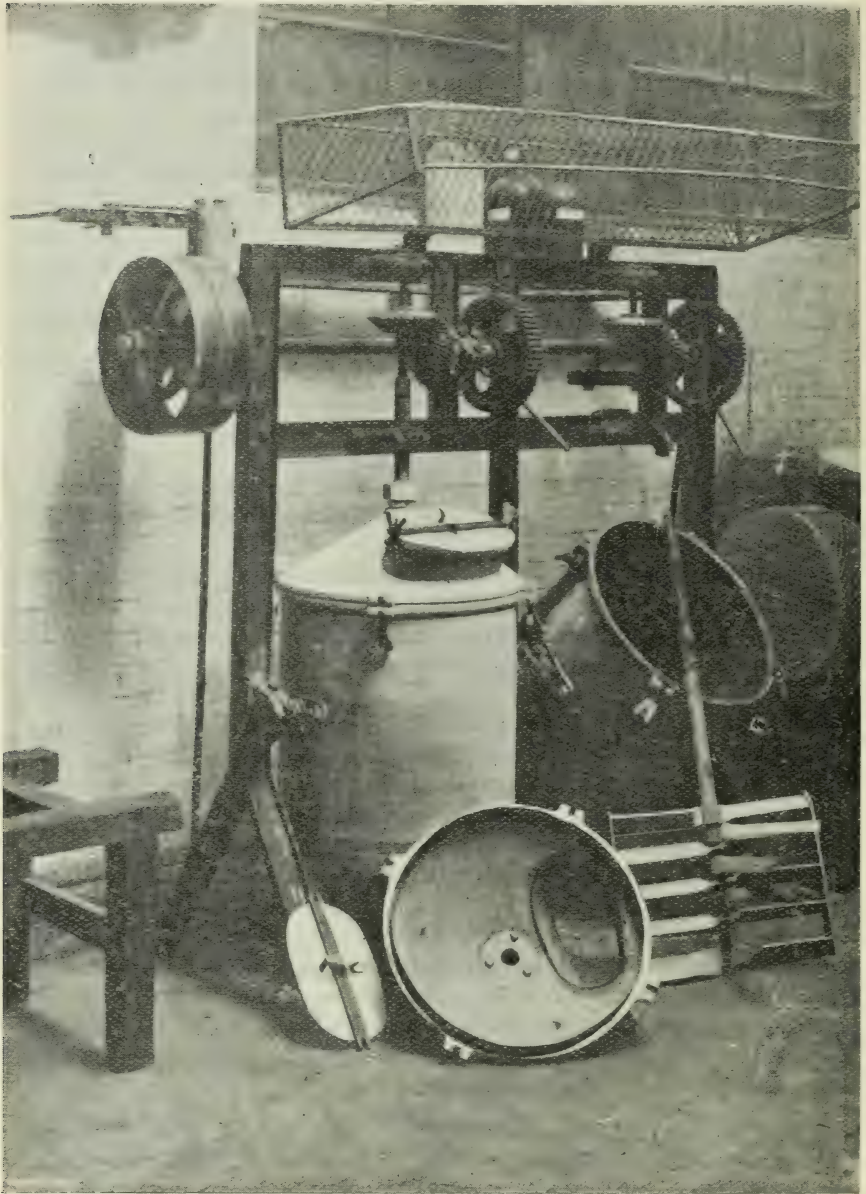


FIG. 34.—APPARATUS FOR EXTRACTING PERFUMES FROM POMADES, SHOWING INTERIOR MECHANISM.

at will and pleasure, for the lemon tree will produce its fruit almost at any time of the year if irrigated accordingly. A large number of the orchards are, in fact, employed for producing the summer lemons

(so-called *Verdetti*) which obtain rather high prices in the foreign markets, and particularly in London.

The natural crop of this tree, however, is from December until March and April, and for the manufacturing of lemon oil only this crop is of interest and importance.

By far the larger number of lemons are shipped abroad to the principal markets of the world, where one may frequently see thousands of boxes arrive at a time. The rest of the fruit is employed in the manufacture of citrate of lime and of essential oil, the former out of the pulp and juice, and the latter out of the peel, which contains this oil in the outer pores. These two industries are closely connected with each other, and are still rural industries in the hands of the peasants in the villages which are located in the midst of the orchards. The manufacture of lemon oil begins in November, when the fruit is still green and not yet ripe.

During the day numerous peasants enter the orchards and pluck as many of the lemons as will suffice for the manufacture the next day. The lemons are brought into the factories and early in the morning (in some parts even at midnight) the processes of manufacture will begin. Large numbers of girls cut the lemons to separate the peel from the pulp.

Until a few years ago only one method was used in cutting the peel off the pulp, viz. to cut it off in three slices, the so-called *spugna* process; but latterly a new method is taking its place, viz. of cutting the fruit in two and taking the pulp out of the two halves by means of a sharp spoon—the *scorzetta* process. The former method gives a stronger essence, while the latter method gives a larger yield of essence, and has the advantage of leaving the peel in such a shape that it can be used for “salted peels.”

The peels separated in one or the other way from the pulp are now put for about twelve hours into a bath of water to soften them, after which they are brought into the pressing-room. Male labourers only are employed in this hard work. Sitting on little stools, close to large baskets containing the peels, they hold in their left hands large sponges into which they press the oil out of the peels with the right hand.

In this condition the oil contains a good deal of foreign matter such as water, dust, &c., which settles at the bottom of the receptacles; the oil is then collected in big copper jars and shipped by rail to Messina, which is the centre of this trade; but the oil has still to undergo a careful filtering process in the warehouses of the exporters before it is fit for shipment.

Besides this hand-pressing method of oil-manufacturing, there is a mechanical way, which, however, is used only by very few manufacturers, as it is rather expensive. An ingenious machine cuts the lemon lengthwise in two, takes out the pulp, and presses the peel against some sponges, which absorb the oil from the pores, from which it drops into a receptacle below. The entire quantity of oil gained by this method is rather insignificant in comparison with that gained by the old-fashioned hand-pressing method.

The yield of the lemons differs widely according to the month of

manufacture, the green fruit containing much more oil than the ripe yellow lemon; besides, there is always a difference between the different years. One might calculate the number of lemons necessary for the manufacturing of one pound (English) of oil, at from 1,000 to 1,400, or even more.

While the orchards of lemons are chiefly in Sicily, those of the oranges are in Sicily and also in Calabria. Of the Sicilian orchards those around Etna, at Paterno, and in that neighbourhood produce fruit of particularly good quality, which is almost entirely exported. The manufacture of oil is chiefly carried on in the large plains of Barcelona, Sicily, and in those of Gioja Tauro in Calabria. In both districts the operation is completed underneath the trees in the orchards, lest the delicate fruit might suffer from transport to the village and the factory. The process of manufacture is just the same as that of lemon oil, viz. the peel is cut into three parts, and the oil is pressed out with the hand.

The bergamot tree—a member of the extensive genus of *Citrus*—grows only in the southern parts of Calabria, along the shore of the Straits of Messina and around Cape Spartivento, the southernmost point of Italy. Wide orchards of this tree cover the lower slopes of the mountains and the valleys between them; all efforts to cultivate the tree in Sicily have failed hitherto.

Contrary to the methods of manufacturing the oil of lemons and of oranges, the bergamot oil is gained almost exclusively by mechanical process. The very round and equal shape of the fruit, which is almost a perfect sphere, makes it very easy to treat by this means. A dozen of bergamots of equal size are placed into a round copper receptacle provided with a heavy lid, which rests, however, on the fruits; the interior of this receptacle is provided with fine small teeth, and the whole revolves around an axis, the teeth rasp off the very outermost part of the peel, which contains the essence, and the pulp thereby produced is then filled into large woollen sacks or stockings of about two feet in length, and from them the oil drops into some vessel placed below the sack, which is gently pressed. The oil is then poured into big copper jars and is ready for the market.

The bergamot is a very delicate tree, and its products differ widely according to the soil in which it is planted. In general, those grown on ground which has been under cultivation for a very long time will give a better oil than the plantations made on new soil; however, this rule does not always hold good, and sometimes plantations which are separated only by a small path yield different oils.

PERFUMES.

Perfumes as they are known to the public are, as a rule, compounded or blended essences prepared from extracts of flowers and essential oils which have been made by one of the processes already referred to, in some instances by the addition of synthetic substances to which I will allude briefly later. In many instances the perfumes are produced from the flowers alone. In other instances a blending of the odours produces the odour of a particular flower.

Immense strides have been made during recent years in the preparation of odorous bodies synthetically. I do not, of course, propose to refer to technical details of preparation of these bodies, but I will give some short account of those bodies which appear to be fairly satisfactory substitutes for those they represent.

Artificial Musk.—There are several kinds of artificial musk, not one of which, however, absolutely represents the actual odoriferous constituent of natural musk. Nearly all the synthetic products are nitro-derivatives of benzene hydrocarbons. The odorous constituent of the original "Musc Baur" was the trinitro-derivative of tertiary butyl xylene.

Vanillin, or methyl-*proto-catechuic aldehyde*, is the active odorous constituent of the vanilla pod, in which it occurs to the extent of about two per cent. It has been artificially prepared from the glucoside, *coniferin*, which is found in various coniferous woods. A later method of manufacture is by the oxidation of *eugenol*, the chief constituent of oil of cloves.

Coumarin, the aromatic constituent of the Tonquin bean, and possessing the delightful fragrance of new-mown hay, is produced synthetically from *salicylic aldehyde* by the action of acetic anhydride in presence of sodium acetate.

Heliotropin, or *pepironal*, is the methylene ether of *proto-catechuic aldehyde*. It was originally made from the alkaloid *piperine* contained in white pepper by boiling with caustic alkali and oxidising with potassium permanganate. It is usually manufactured from *safrol*, a constituent of Japanese camphor oil, by oxidation with chromic acid.

Aubépin (hawthorn or May blossom) is *anisic aldehyde*. It can be prepared by oxidising *aniseed oil*, or from *phenol* by a series of reactions.

Ionone (artificial violet) is produced by the action of alkalis on a mixture of *citral* and *acetone* in the presence of water. The products of the reaction are extracted with ether and fractionally distilled.

Artificial Neroli.—*Nerolin crystals* consist of the methyl ether of *beta-naphthol*, prepared by heating *beta-naphthol* with methyl alcohol and sulphuric acid for several hours under low pressure. Synthetic *neroli oil* is a mixture of various bodies, the chief constituent of which is the methyl ester of *anthranilic acid*. This may be obtained from *aceto-orthotoluidine* by oxidation.

Terpineol (artificial lilac) may be prepared from *terpin hydrate*, a body obtained from oil of turpentine. Another process consists in treating *pinene* with acetic acid in the presence of zinc chloride and decomposing the *terpineol acetate* so obtained by saponifying with caustic alkalis.

Distilled waters derived from various flowers are probably familiar to all of you, the waters being used for toilet purposes, and also at banquets, &c. The blossoms principally used are those of the rose and orange, and for the distillation of these the whole of the flower, pistils, and petals are used.

The usual method of operation is to produce an equal weight of distillate to the flowers employed—that is to say, take a load of 500 kilos. (10 cwt.) of flowers for a still—add 600 kilos. (12 cwt.) of water, and then to obtain by distillation a quantity of 500 litres (110 gallons), leaving 100 litres (22 gallons) to prevent the flowers from burning in the

process of distillation. Various strengths of these waters are sold, the highest concentration being that which represents the two parts of flower in one part of the distillate.

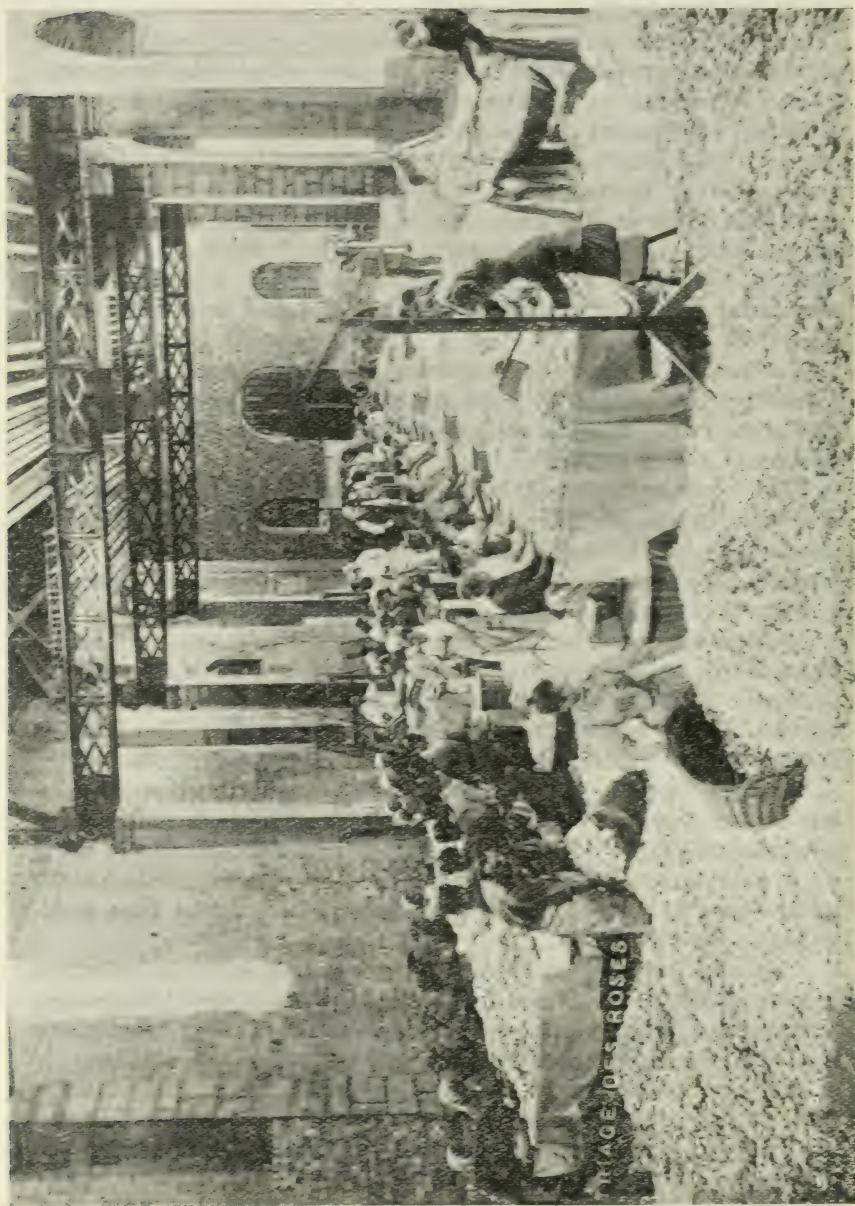


FIG. 35.—SORTING ROSE PETALS AT GRASSE.

It may be interesting to record the succession of the flower crops in the South of France. The work is practically continuous from early March to the beginning of November. The months during which the flowers are collected are as follows :—

In March and April, violet and jonquil.

In May and June, rose and orange blossom.

In June, the orange leaves, which yield the so-called petitgrain oil.

In June and July, thyme and rosemary.

In August and September, jasmine, tuberose, lavender, and spike-lavender.

In September and October, rose geranium (pelargonium).

In October, cassie.

It is hardly, perhaps, in my province to refer to any commercial points, but there is one of special interest which latterly has largely disturbed the relations of the Grasse perfume houses and their customers all over the world. A syndicate of owners and growers of orange flowers has recently been formed which has for its object the establishing of a price for flowers in their own interests, and without much reference to the perfumers.

Dissatisfaction was shown by the growers at the beginning of each season at the price which was paid for the flowers; but this price being maintained through the season, it as a rule became a fair average one, the yield of flowers being so much greater in June than at the beginning of the crop in April. The difficulty is increasing, and it has resulted in very high prices ruling for such important oils as neroli (orange flower) oil, and it will probably extend to other cultivations and their products. The last and present season have not been at all favourable for the working of such a scheme owing to the frosts, which have very considerably interfered with the blossoming of the orange. There is also a syndicate ruling the price of flowers of cassie, but so far no other has been established.

The world's production of perfumery is stated to be as under. (1,000 kilos. is almost the same weight as a ton):—

FRANCE.

Cassie . . .	20,000 to 30,000 kilos.
Violets . . .	300,000 „ 400,000 „
Roses . . .	1,500,000 kilos.
Orange flowers . . .	2,000,000 „
Jasmine . . .	500,000 to 800,000 „
Oil of lavender . . .	80,000 kilos.
Aspic . . .	30,000 „
Thyme . . .	20,000 „
Rosemary . . .	20,000 „

Representing a value of more than 30,000,000 frs. (£1,200,000).

ITALY.

Oil of bergamot	} 1,600,000 kilos.
„ orange	
„ lemon	

Valued at 14,758,000 frs. (£590,320).

BULGARIA.

Oil of rose . . .	4,000 to 5,000 kilos.
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Valued at 3,500,000 frs. (£140,000).

ALGERIA.

Oil of geranium . . .	30,000 kilos.
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ZANZIBAR.	
Cloves . . .	4,000,000 to 7,000,000 kilos.
BOURBON.	
Oil of geranium .	30,000 kilos.
Vetiver . . .	Some.
INDIA.	
Sandalwood .	1,500,000 kilos.
Oil of citronella	500,000 „
„ palmarosa }	
Lemongrass }	
Cinnamon }	
MALACCA.	
Leaves of patchouli	150,000 kilos.
Vetiver roots }	
CENTRAL CHINA.	
Thyme, anise, cassia.	
PHILIPPINES.	
Ylang-ylang	To the value of 500,000 frs. (£20,000)
JAPAN.	
Oil of peppermint	200,000 kilos.
Camphor . . .	A considerable amount.
UNITED STATES.	
Oil of peppermint	100,000 kilos.
MEXICO.	
Oil of linaloe . .	—
PARAGUAY.	
Oil of petitgrain .	3,000 kilos.

No statement is included of the large essential oil products of Spain. At the present time very large quantities of rose, spike lavender oil, and other oils are being produced in Spain, and the industry promises to become a large one. So far no great attention has been paid to the industry, and the products are coarse; but no doubt, with increasing demand, greater attention will be paid to the subject and considerable improvement attained.

CULTIVATION IN THE COLONIES.

It is evident from the above table that the principal cultivation of plants for perfumery has been developed hitherto in other parts of the world than in the British Empire, but our Colonial Governments are not standing still, and within recent years considerable experiments have been made in Australia with a view to determining what plants can be cultivated for the distillation of essential oils or the extraction of perfumes in some of their beautiful climates. From the Government flower farm at Dunolly, Victoria, there was recently sent to the Imperial Institute, and submitted to me for examination and report, a series of essential oils, including attar of rose, oil of lavender, geranium oil, and others; also essence of jonquil and tuberose.

Although these products cannot be said to be equal to those prepared in the South of France, yet there is every indication that they may be improved, and at any rate in climate and soil there is nothing wanting.

ON THE ORIGIN AND PECULIARITIES OF
CLIMBING PLANTS.

By Rev. Prof. G. HENSLOW, M.A., V.M.H., &c.

[Abstract of Lecture given on October 9, 1906.]

AN abstract of a lecture on "How Plants Climb," delivered to the students at the Chiswick Gardens, June 1901, is reported in this Journal (vol. xxvi.), so that there is no need to reproduce the same details; but I would wish to illustrate three features more fully. The origin of certain climbers is there suggested to be due to overcrowding and the consequent obscurity. With regard to this Professor Warming has some interesting observations on the plants of Lagoa Santa, Brazil. He writes as follows on the genesis of tropical lianes:—"Twining and clasping climbers are a product of forests with deep shade. The evolution of these plants will have been, without doubt, thus: Germinating in the shade the young plant is forced to grow in height, and its branches, to elongate, and become slender. The *first* step is seen in the plants lying simply upon the boughs of the shrubs and trees. These 'sarmentous' climbers are numerous in the flora of Lagoa Santa, e.g. *Chamissa*, *Gomphorena*, &c. The *second* step, already marked by signs of adaptation, is very clearly pronounced, in which the branches spread out at right angles to the axis, so that they rest with more ease and security upon other plants. The *third* step is seen in twiners in which the circumnutation assists; but in a general way adaptations of a morphological kind are rare. The *fourth* step is represented by *clasping*, provided with a special apparatus. In this category, at the bottom of the scale, are *spiny* climbers; at the summit are plants with tendrils and sensitive organs of adhesion."

M. Costantin in his work on "Tropical Nature"* alludes to M. Schenck's study of lianes, who similarly observed how species living in the open were non-climbers, but when within a forest became climbers. He mentions *Fuchsia integrifolia* occurring both in the forests of the mountains of Brazil, where it climbs to a height of three metres, and outside on rocky ground where it forms bushes about 5 to 6 feet in height. He considers the former to have been derived from the latter, as two other species of *Fuchsia* in Brazil are bushes like so many others. As another case he mentions *Hebanthe holosericea* (ord. *Amarantaceæ*).

This conclusion is corroborated by experiments. So far as I know, the great surgeon J. Hunter first called attention to the fact that if seeds of non-climbing plants be allowed to germinate in the dark and be provided with a stick they become climbers. In his "Memoranda on Vegetation" he thus writes:—"On Creepers, Climbers, Clingers, and Twisters.—It would appear that weakness in anything that has powers of action within itself, produces or stimulates the parts, so weak, to take all advantage of collateral support. Even a bean, which when strong seems

* *La Nature Tropicale*, p. 84.

to depend entirely upon its own powers, yet, if it grows weakly, as when not in the sun, or from any other cause acting to hinder strength when growing—in such, if a stick is put into the ground close by it, it will twine round it in loose spiral turns.”

Similar experiments have been carried out by later botanists; thus Noll found that the buckbean (*Polygonum. Fagopyrum*) would climb. I have tried the greater periwinkle (*Vinca major*), which, usually making long shoots, which root at their ends, but does not climb, did so when grown in the dark and the shoot was etiolated.

The converse to the above also holds good. Normally climbing plants can become creepers on the ground in the absence of supports. Thus our bindweed may have half its shoots climbing up the iron rods of palings while the rest creep along the ground, just as they do on a sunny bank, as by a railway, where there is no support handy. Our maritime *Convolvulus soldanella* does not climb, its habit having become adapted to a sandy shore, like *Ipomœa pes-capræ* in warmer climates. Similarly, in the desert near Cairo, *C. lineatus* and *C. lanatus* are short woody plants forming little shrubs, while *C. althæoides* both climbs and creeps on the ground in Malta, like our own bindweed.

As an example of the first step described by Professor Warming, I found an illustration in *Ruscus hypophyllum*. A number of large plants were growing in pots in a very dark corridor in Malta. They had sent out long etiolated shoots, which were intertwined among the green stems, but not climbing spirally.

A little more advanced case is described by Darwin in *Hibbertia dentata*, which behaved at first just like the *Ruscus*, but subsequently climbed spirally.*

In the lecture referred to above I mentioned the difference between the two species of *Ampelopsis*; thus *A. hederacea*, the Virginia creeper, does not produce adhesive pads until *after* contact has been made; but *A. Veitchii* develops them partially before any external irritation has been set up. Hence this affords an excellent illustration of the acquirement of an hereditary character by mere external irritation upon the soma, in this case metamorphosed *flowering branches*.

That the power to produce these adhesive pads is inherent in protoplasm generally is apparent from the fact that they are found in other families of plants. Thus in *Bignoniaceæ* Darwin gives an interesting description of the behaviour of *Bignonia capreolata*, which developed cellular “balls” in order to envelop the fibres of cotton and flax supplied to them. Darwin saw eight discs formed on the same tendril. He notes also “the singular fact that a leaf should be metamorphosed into a branched organ, which turns from the light, and can by its extremities either crawl like roots into crevices, or seize hold of minute projecting points, these extremities afterwards forming cellular outgrowths which secrete an adhesive cement and then envelop by their continued growth the finest fibres.”†

Darwin adds in a note that “Fritz Müller states that in S. Brazil the trifid tendrils of *Haplophium*, of the same family, without having

* *Climbing Plants*, p. 35.

† *Ibid.* p. 103.

come into contact with any object terminate in smooth shining discs. These, however, after adhering to any object, sometimes become considerably enlarged," * just as do those of *Ampelopsis Veitchii*.

There is yet another genus which behaves in the same way. A leaf of *Arthrophyllum cirrhatum* (*Bignoniaceæ*) has three leaflets, but the terminal one is converted into a rod with a disc at the end. This is present in the youngest bud long before it can be used for climbing purposes.

The cucurbitaceous genus *Trichosanthes* supplies another instance of the formation of adhesive discs in response to contact. *T. anguina* was grown in a frame; and although its tendrils are constructed for climbing, like those of other members of this family, whenever their apices touched the brick walls of the lights they formed adhesive pads, as in the above-named plants. Lastly a common sea-weed, *Plocamium coccineum*, with a much branching thallus, produces adhesive pads at the tips of its branchlets when they happen to rest on the thallus of another sea-weed, such as of *Laminaria*.

The anatomical structure of the stems of climbing plants is generally very anomalous, but more or less characteristic of each family. Certain common features prevail; there is a relative increase of pith and medullary rays, the latter sometimes occurring as wedges. The number and size of the water-conducting vessels are increased in comparison with ordinary erect stems. In some the pericyclic fibres are much developed; and as all external layers of bark exfoliate, they form a "stringy" coat to the stem, as occurs in *Clematis* and the vine.

On the other hand the wood degenerates, this being a supportive tissue: this means of support is superseded by suspension. This is seen in a piece taken from the inner part of the stem of a vine, which will when fresh be quite flexible and of a soft spongy texture.

Such differences are easily perceptible in comparing a free-growing shoot of ivy with that of a twig of the same diameter when supported by climbing roots; the relative differences between the wood and pith are chiefly observable. Similar differences will be found in *Wistaria*, woody nightshade, &c. They show that the change of structure occurs simultaneously and immediately with the change of position, *i.e.* whether the shoot is self-supporting or supported by some other means.

It has often been noticed that as soon as some supporting contrivance, hook, tendril, petiole, &c. has secured a hold on some structure these organs at once increase in strength and put on mechanical tissues, as wood &c.—for the tension caused by the weight of the plant is now "felt"—and it at once sets to work to meet and resist the strain.†

* *Climbing Plants*, p. 102, note.

† I have discussed this more fully in *The Origin of Plant Structures*, chap. x, p. 197.

THE VALUE OF FRUIT AS FOOD.

By DR. JOSIAH OLDFIELD.

[Lecture given on October 16, 1906.]

It is, perhaps, specially fitting that your Society has selected me to read before you a paper on the value of fruit as food.

In the first place, I am a physician; and, if there is one class of the community who ought to study the problems of diet and teach them, it is the medical profession.

It is to me a matter of the profoundest regret that our medical journals are filled almost wholly with papers dealing with drugs and with surgery, and so little is the interest taken in the far more important subject of food, that editors (who are usually led by their readers instead of being guides and leaders of their *clientèle*) always regret that they are unable to find space for papers on this subject, and treat it as if it were a matter of minor consideration.

Now I am bound to maintain that since food modifies our body cells, and since our body reacts on our mentality and on our spirituality (or lack of it), and is the instrument through which the inner self manifests itself to its environment, there is no subject more important for the physician of the body, for the teacher of the mind, and for the healer of the soul, than the study of foods. This was recognised by the early fathers of medicine, and by the early fathers of the Church, and by the great founders of great religions: and whether it be Celsus or Hippocrates, or whether it be Moses or Gautama, we find the most important place assigned by them to food and feeding.

It is only modern medicine and modern religions which have climbed so high into the attics of dogmata as to neglect the fundamental base by which bodily phenomena are produced.

I feel, therefore, that it is fitting that a physician should take up his parable before you and change the usual course of your lectures from the subject of fruit-producing to the allied subject of fruit-eating.

In the second place perhaps you have selected me in harmony with what is fitting because I come from the garden of England—I had almost said the Garden of Eden—and though I am not a Kentish man by birth, yet Kent has been my home for many years, and it is in this county that the premier hospital for the treatment of diseases on a fruit dietary—the Lady Margaret Fruitarian Hospital, Bromley, Kent—was founded by me some years ago, and where it has flourished in such a marvellous way that it is known all over the world, and receives applications for admission of patients from so far afield as France, Italy, Austria, and even Hong Kong.

At the outset, however, I should like to make my own position clear.

Some people imagine that I am a vegetarian, and that my opinion, therefore, on the question of food is warped by a certain faddism. Now

this is untrue. I am not a vegetarian and have no connection with any vegetarian society.

My attempt in life has been to discover a dietary best suited to the health and longevity of various classes of the community, and to be influenced in my search by my artistic and æsthetic sensibility.

In this search and in the experiments I have conducted, and from my personal observation of some four thousand people, whom I have strictly dieted for various diseases, and from the records I obtained from the four men whom I experimented on for a period of three months, under the close surveillance of the "Daily Express," I have learned to have a very great regard for the value of fruit as food.

I would remind you, in the first place, that the same dietary is not suitable to all persons. What is one man's meat is another man's poison. What is an excellent dietary for a brawny navvy may be a most unsuitable one for a fragile, sedentary student. A selection of dishes which would be admirable in summer might be quite inadequate during a rigorous winter.

There are some constitutions which have stomachs like portmanteaus, and though you fill them with lobster salad and pickled pork, washed down with sour wine, and weighted with filberts, they will turn up smiling and asking for more; whereas to others the capacity to digest the weakest of paps is only kept up by the constant use of taka-diastase, papaine, or similar digestive adjuncts.

Some men live on beef and beer to a good old age, and therefore they imagine that everybody ought to be able to do the same.

If there is one thing more than another which my medical experience has taught me, it is that personality plays an immense part in dietary, and that any proper application of the food problem requires us to recognise that there is an immensely large common ground to the human race in food; but that there is an equally important necessity for variation to meet the individual needs of individuals of that race.

When we come to the food value of fruits we are face to face with the study of the world's history and the world's evolution, and the effect of diet in an infinite number of countries and climates, and on an infinite number of races under the most varied conditions. The subject is therefore the study of a lifetime. Happily, however, that is not what you want here.

I imagine your feeling is much the same as my feelings were last year when I saw notices of your great show, and when the Press, very wisely commenting on the show, said: "Here is a wonderful collection of fruit wonderfully grown; but why does no one teach the people its real value when it is grown?" I therefore have come with the simple purpose of helping you who are *growers* of fruit by trying to encourage the people of England to become wise *eaters* of fruit.

It is interesting to note that the word "fruit" is derived from the Latin *fructus*, which comes from the root "to enjoy," and therefore fruit is by its very name a thing of enjoyment; and this, I think, appeals to us all, for from childhood up we have been accustomed to associate the oranges and grapes and fruity plum-pudding with seasons of joy and merriment.

To some the surreptitious enjoyment of the fruit of the jam-pot and the orchard was at times, however, marred by recollections of after-pains on being caught.

Poets and painters and fairy story tellers always bring in fruits, luscious and beautiful, whenever they want to depict times of happiness and enjoyment. Well is it, therefore, for us to remember that fruit is derived from the word which means enjoyment.

Now, the popular idea is that fruit has *only* to do with pleasure, and has nothing to do with nutriment, and it is this popular fallacy which I want to help to explode.

Many people have an idea that dessert is only an after-dinner dalliance; whereas, in effect, the best and hardest of work can be done on a fruit meal.

The one redeeming feature of our after-dinner dessert is that children are allowed to come down for this, so that to them it becomes—and rightly becomes—a happy meal.

There are several ways in which fruit is important as food.

First. It is itself a food, and, if rightly selected, a complete and full nutriment—for every condition of the body, in every climate, and under every condition of work and of constitution and of health and of digestion—can be obtained from a fruit dietary.

Second. Fruit is of essential value in assisting other foods to be digested.

Third. Fruit is of the utmost value in helping the body to eliminate waste matters which produce debility and old age.

Fourth. Fruit is almost the only food possible in some forms of disease, and is largely curative as well as nutritive.

In the first place, fruit, when rightly selected, forms a complete nourishment for the body in a most assimilable form. The elements necessary for bodily sustenance have been classified by many authorities in various ways, but the one which is most generally accepted divides food into the following classes:—

First. The aqueous matters.

Second. The saccharine matters.

Third. The oleaginous matters.

Fourth. The albuminous matters.

Fifth. The saline matters.

Milk and the yolk of eggs, both of which provide complete nutrition for embryonic and early life, are composed of the above substances. Are these substances found in fruits in a proportion suitable for human food, and in a form suitable for human digestion?

It is not enough to say that strawberries contain sugar, and bananas starch, and melons water, and Brazil nuts oil, and peanuts albumen; but the percentage of their composition must be carefully noted, otherwise we may find ourselves dealing with fruit like the man of Bromley with his beer, who, being found all day long imbibing ale in a public-house, explained his action by saying that he had been to a lecture where the lecturer had been giving the composition of foods, and had impressed upon his audience that to get the necessary amount of nitrogen which the body needs daily from beer it would require a man to drink

158 pints per day, and he was doing his best to get through it, but he found it a hard job!

This is the common fallacy of many beginners in chemistry. They take gooseberries, for example, and find they contain only 0·37 per cent. of albuminous matter, and therefore they argue that if a man were a fruitarian he would have to eat 3 lb. of gooseberries per day to get the albumen of one egg, or about 42 lb. of gooseberries per day to get the necessary amount of nitrogen for his daily sustenance. It would be just as wise as to argue that if a man eats meat he would have to eat 20 lb. of beef per day to get the necessary amount of carbohydrates.

I have drawn out a list of analyses of some of our commonest fruits :—

	Gooseberry	Grape	Cherry	Peach	Apple	Pear	Chestnut	Walnut	Filbert	Almond	Pistachios	Peanut	Cocoanut
Water	85·36	79·98	79·70	82·01	85·04	83·95	14·0	44·5	48·0	6·0	7·4	—	46·6
Glucose and sugar	7·51	13·78	10·70	1·53	7·58	7·00	17·5	—	—	—	—	—	—
Free acid	1·33	1·02	0·56	0·77	1·04	0·07	—	—	—	—	—	—	—
Albuminous substances	0·37	0·83	1·01	0·39	0·22	0·26	8·5	12·5	8·0	25·0	22·0	24·5	5·5
Soluble pectine	2·11	0·50	0·67	9·28	2·72	3·28	—	—	—	—	—	—	—
Soluble minerals	0·24	0·46	0·60	0·76	0·44	0·28	—	—	—	—	—	—	—
Starch	—	—	—	—	—	—	29·9	8·9*	11·1	9·0	13·0	—	—
Dextrine	—	—	—	—	—	—	22·9	—	—	—	—	—	—
Oil	—	—	—	—	—	—	1·3	31·6	28·5	54·0	51·0	50·0	8·1
Cellulose	0·24	0·46	0·60	0·76	0·44	0·28	3·3	0·8	2·5	3·0	2·5	—	2·9

Mucilage.

In the first place :—

Aqueous Substances.—Water is an essential of life, and water should be of the purest character. There is no water more pure than that which has been distilled from dew and trebly distilled from the clouds of heaven and stored within the dainty myriad tanks of an apple or a pear! There is here no fear of hard or chalky water or typhoid germs. Fresh fruit juice gives water at its best.

A water melon contains about 95 per cent. water, blackberries and currants 82–87 per cent., plums, peaches, apples, and pears, 82–85 per cent., grapes and cherries (which people wrongfully think are the most watery) from 78–80 per cent., cocoanut 46 per cent., walnut 44 per cent., chestnut 14 per cent., almond 6 per cent. They are not greatly more watery than milk, which, with 54 per cent. water, is a complete infant's food.

With regard to the first essentials of food, fruits fulfil the functions of a perfect food. So that fruits are the first cure for drunkenness.

With ordinary foods a man needs to drink, and, when he needs drink, beer is one of the handiest, and spirits some of the most tempting, of drinks to indulge in; but with a meal of fruit no drink is needed,

and so even drunkards, if fed on fruit, instinctively lose the craving for drink.

2. *Saccharine Matters*.—In fruits the saccharine matter is in the form of grape sugar, or glucose, into which starch is converted by the saliva and pancreatic and intestinal juices.

The most important point about this class of nutrient elements is that they do not pass into the excretion or put any strain on the excretory organs, but are oxidised and pass into carbonic acid and water as their ultimate products, and are therefore great heat factors and not exhausting elements of excretion. As they pass towards their final goal they are transformed into lactic, acetic, butyric, and other acids; and these, when produced in the small intestines, are of the greatest value in helping the change and absorption of proteids by increasing diffusibility through the membranes into the lacteals.

The amount of sugar in fruits varies very much, but it is always considerable. The ratio of free acid to sugar varies enormously with the season and cultivation, *e.g.* in 1847 the ratio of acid to sugar in fresh grape juice was 1 to 12, in 1854 1 to 16, in 1848 1 to 24 in the same kind of grape. In plums it is about 1 to 1·63, in currants 1 to 3·00, in strawberries 1 to 4·37; but where the sugar is high the fruit may not taste so sweet because, in some of the sweeter-tasting fruits, although the proportion of acid to sugar is higher, yet the acid is covered by the presence of much pectine, *e.g.* greengages, peaches.

Cultivation, too, has a great deal to do with altering the ratio of acid to sugar, *e.g.* in cooking apples the ratio is about 1 to 8, whereas in dessert apples it is 1 to 12, and in the finest sweet sorts 1 to 22. In fruits like the banana and breadfruit and sweet chestnut, filbert, and pistachio there is a considerable amount of starch still untransformed into sugar.

Dried fruits contain so much less water that, weight for weight, their sugar value is very high, *e.g.* dates and dried figs have 48 per cent., raisins 56 per cent., while of the fresh fruits—

Grapes	contain	12 to 16	per cent.
Cherries	„	8 „ 13	„
Apples	„	6 „ 8	„
Pears	„	7 „ 8	„
Plums	„	6	„
Red currants	„	4·75	„
Greengage	„	3·5	„
Peach and apricot	„	1·5	„

There is therefore no dispute that in the essential saccharine matters fruits stand out as perfect foods.

3. *Oleaginous Matters*.—When I come to oils and fats I believe that I am dealing with one of the greatest of all secrets of health, vitality, and long life. I am satisfied from observation and experiment that fats are the most important of all food elements.

People unconsciously recognise this when they try to make boys and girls eat fat meat, but they forget instinct which rejects that form of fat.

Again and again I advise my nerve patients to eat more fat, and they reply, "Oh, but I don't like fat," and I always answer, "Don't you like butter?" "Oh yes," they glibly reply; "I like butter." "Well, then," I ask, "did you ever see any lean butter?" The fruit world is full of fat. The olive yards always formed one of the foremost pictures in the sweet memories of the land of Canaan, and now the markets are full of olive oil, Darlene (a refined preparation of cocoanut butter), almond oil, walnut butter, almond butter, &c.

The chestnut contains 1·3 per cent. of fat; the walnut, 31·6 per cent.; the filbert, 28·5 per cent.; the almond, 54 per cent.; the pistachio, 51 per cent.; the cocoanut, 35·9 per cent.; the peanut, 50 per cent.; and the delightful little pine kernel is like a little cone of nutty fat.

These fats are all clean and wholesome, free from taint and free from disease, and of a most delightful flavour.

I am growing daily more and more convinced of the great importance of nuts and nut butters and nut oils for food. It is often objected that nuts are indigestible, and this is true of all foods that are swallowed without mastication; but nowadays the difficulty is entirely obviated by the process of putting the nuts through a nut mill or using them malted. An Orange's nut mill will at once transform shelled barcelonas or walnuts, brazils or almonds, into a fluffy, snowy meal—dainty, digestible, and full of nutrient fat.

The two classes of fruits I have mentioned—the sweet fruits and the fat fruits—make an ideal combination, and I know few dishes more delightful than some good Tafilat dates with the stones removed and the spaces filled up with walnut meal. The result is a sandwich of exquisite flavour and of great nutritive value in a small compass.

The immense value of fat as a powerful food is shown by the fact that ten grains of fat will, by combination with oxygen, develop enough heat to raise 23·30 lb. of water one degree Fahrenheit; that is, the equivalent to the power of raising 18·003 lb. one foot high.

The malted nuts are now sold under many names, and turn out in appearance and flavour very like potted tongue, only much richer in fatty elements. I believe there is a great industry ahead for those who take up extensive nut culture coupled with a nut meat factory.

4. *Albuminous Matters*.—Now it is here that so many people imagine that fruits are deficient in food value. Liebig laid so much stress on proteids and their constituent nitrogens that, ever since, people have been scared lest they should weaken and die unless they took an ample supply of this element. I can only very shortly deal with this vital subject here, but let me emphasise upon you all—

First, that Liebig's theories are not now held by the best physiological dietists.

Secondly, that Carl Voit and his school, who still uphold the need for a high ratio of proteids, lay down the law that "a diet which contains the smallest amount of proteid that will suffice to keep the body in a state of continual vigour is the ideal diet," because proteids, as they are being used up in the body, produce decomposition products which are a constant menace to the welfare of the body, and any surplus proteid therefore may be an actual source of active injury to the system. This is seen in

cases of gout and kidney disease, as the result of waste uric acid in the system.

Thirdly, that the latest experiments, as, for example, those of Jaffa on the fruitarians of California, and Kumagaiva's experiments on the diet of the Japanese, Chittenden's experiments on sedentary and active workers in America, and my own experiments of this year have proved, I think, conclusively, that the ordinary proteid ratio is far too high, and may be cut down by 50 per cent. with the greatest advantage so long only as a sufficiency of fat is provided.

Fourthly, that even if the old high ratio were maintained, there is ample store of proteid in certain forms of fruits. If we go to the fruits of the legumes and include beans, peas, lentils, and dahls, we get an immense store of proteid in a most concentrated form, so that the addition of even a small portion of any of these fruits at once brings up the day's rations to a high proteid level.

In the same way the cereal in of wheat and other cereals gives us the proteid we require in a very delightful and digestible form.

It is true that I should need to eat four pounds of pears to get as much proteid as is found in one egg, but if I use my pears to obtain the water and the sugar, and take almonds and pistachios or walnuts or peanuts to provide the albumen and the fat, I get a highly scientific combination of complete nutrition.

I know few combinations in the whole range of foods more perfect than almond meal or walnut meal and raisins. The prophet of old who did his forty days' walk on a handful of parched corn and a barley loaf and a cake of figs and a cluster of raisins was a scientific dietist; and the Japanese, who followed these lines, proved themselves better commissariat officers than the Americans, who fed their soldiers in Cuba on the best Chicago "mysteries."

Lastly, the Salines.—I can hardly over-estimate the importance of the salines in the human economy. Nerves could not work, teeth could not grow, blood could not circulate, dialysis in digestion and absorption would be impossible without them; and where do you get the salines from? The world of fruits. Phosphates of lime in the bones, alkaline phosphates in the blood, muscle and milk, constantly being excreted and fresh salines constantly being demanded, the fruits become an essential of the human economy.

Time will not allow me to deal with the other heads that I laid before me—viz. to show the value of fruits as digestants and as preventers of old age by being assistant excretants, and as being actually curative in many forms of disease.

Let me therefore be satisfied to say that in my opinion—

First, Englishmen could live in better health and with greater freedom from disease if it were necessary to do so upon fruits and nuts produced in England alone (including the fruits of grasses—*e.g.* cereals and legumes—under this title).

Secondly, fresh ripe fruits may be used by young and old alike during the summer, but that juicy fruits should be eaten with a fatty addition—*e.g.* strawberries and cream, and they should not be used largely in cold weather.

Thirdly, sweet dried fruits may be eaten all the year round, and should be eaten with nut meal.

Fourthly, raisins stand at the head of all fruits, and if soaked for twelve to twenty-four hours before being eaten are the finest of fruits for curing anæmia and debility, and for supporting the needs of the body in old age as well as in youth.

Fifthly, tomatoes, walnuts, nut butters, peanuts, malted peanuts, are rich in proteids, and produce most meaty dishes when wisely prepared.

Sixthly, apples and grapes should be in every house in the land all the year round, and when they cannot be obtained raisins should be used so that every adult eats four pounds of apples or grapes or one pound of raisins per week.

Seventhly, nuts are far too little known, but are of immense importance. The newer pine kernels and butter nuts are readily digestible, while most of the other nuts can be used if put through a nut mill, and the remainder can be eaten by nearly everybody if used in their malted form; while the nut butters should replace all the other animal fats for those who love daintiness and purity from disease.

Eighthly, fruits and nuts may be taken at any time of the day if due care be taken in mastication, but if taken with cereals they are better taken early in the day rather than at night.

Ninthly, the best adjuncts to fruit are cream, clotted cream, curds and whey, milk puddings, fresh cheese, cream cheese, and honey.

Tenthly, by the right use of a wisely selected fruit diet a large number of diseases which are caused by excess of proteid waste (*e.g.* gout, headache, constipation, debility) can be cured.

Eleventhly, by the right use of fruit juices and fruit salines the deposits which are the causes of old age can be reabsorbed, and youth and activity be perpetuated much longer.

Twelfthly and lastly, I believe in the old adage, only in a much more amplified form, that "an apple a day keeps the doctor away," and that it would be to the permanent welfare of England to grow more apples and breed fewer doctors.

HORTICULTURAL EDUCATION.

By F. J. BAKER, A.R.C.Sc.

[Lecture given on October 23, 1906.]

EDUCATION is being so much discussed at the present time that the subject becomes wearisome to many. Only six weeks ago the lecture given here, although under a somewhat different title, really covered almost the entire range of horticultural education.

Considering that the subject has been so recently dealt with, I propose to restrict myself, as far as possible, to the branches either omitted or dealt with very briefly.

One very frequently hears the question, Why is it necessary to educate so highly the gardener and others? Our fathers and predecessors did very well without so much book knowledge; why is it so necessary to-day? Among the answers which may be given to such querists I would say, formerly the number of varieties of cultivated plants grown was very much more limited than now. Those few were generally hardy, although in other respects not up to present-day requirements, they were better able to withstand climatic changes and attacks of enemies.

Cheap glass has enabled the cultivator to force—often unduly—an enormous number of plants; and has often, alas! induced him to become comparatively careless of ordinary cultural methods out of doors. Chemical fertilisers enable him to push on plants, to modify their vegetative and reproductive parts to a degree altogether beyond the dreams of the older cultivators.

These aids are largely the outcome of scientific investigation. Cultivators to-day are employing the fruits of the labours of past and present investigators. In order to obtain the greatest benefit, it is necessary that each cultivator should himself possess a sound, if elementary, knowledge of the nature and properties of the substances he employs. I give one example. Our forefathers fully appreciated the value of lime (either freshly burnt or the mild forms) as a sweetener and general improver of the soil. To-day it is much neglected, but one commonly used fertiliser is superphosphate of lime, a substance which is rightly said to contain much lime; but unfortunately this lime is quite incapable of sweetening—indeed, so acid is superphosphate of lime that it is most essential there should be sufficient mild (or carbonate of) lime previously in the soil in order to rectify the extreme sourness. One often finds cultivators making fatal mistakes through not knowing the nature of the substances employed.

Horticultural education may be divided, briefly, into that given in colleges, where future instructors and many who hope to become leaders in the gardening world and the like are being trained; County Council lectures, given by persons sent out to selected centres, to reach the masses of the people; school gardens and other work to instruct the children; and

lastly *private effort*, where an enlightened individual is spending all his spare time in self-tuition, and possibly receiving a little assistance through the post, or from evening classes on allied subjects in a technical institute.

We are accustomed to hear the work of colleges lauded to the skies in flowery speeches on public occasions. Those who know, must discount heavily the flattering reports which appear in the periodic Press. Not infrequently some of us wish these were more moderate and strictly honest, so that the plodding worker who has no such opportunities should not be discouraged. One realises that college courses are *at present* well-nigh indispensable stepping-stones to the better-salaried posts. But, notwithstanding all the glamour, there is unquestionably a great deal of discontent respecting college instruction. We should recognise that although certain students have won many laurels during, and at the end of their college course yet they become failures as cultivators; that when an experienced employer wants to engage an assistant he usually avoids the college-trained garden or farm student. (He may not always state why to the applicant.) Is the objection justified?

As an ardent educationist I sincerely regret having to admit it is perfectly justified in probably the majority of instances. As a practical cultivator who has succeeded in making gardening and farming pay, I must frankly admit that bitter experience has taught me to reject the college-trained person when I require help. These things should not so be. What are the causes of the failure? I will not probe the subject deeply, but I feel very strongly there is not sufficient co-ordination between the scientific and the garden or field work. The house is often divided against itself. In how many of our agricultural or horticultural institutions are the guiding organising minds really successful practical cultivators? High degrees they may have, but can they run a market garden or a farm on a successful paying basis? It is said college farms &c. are not a success. Why not? That professor's gardens are fruitless and unprofitable. Why so? These questions arise, and if we would be honest and succeed they should be investigated, and if possible solved. Attached to every agricultural or horticultural college there should, of course, be sufficient land cropped for teaching purposes, for demonstrations, and for practice of students. As many varieties of different kinds of plants should there be grown as possible. Plots for demonstration should be kept distinct from those for experiment if it be considered wise to have experimental plots there. Plots for demonstration being essential for educational purposes, the cost of "upkeep" must be borne by the institution. Apart from this, it is, in my opinion, most desirable that land should be managed by the authorities, or possibly by the director himself, where students do no work whatever; where the methods, as far as practicable, advocated in the lecture-room are acted upon and their utility proved. Students could visit them at certain intervals in charge of the lecturer and note carefully what was done, and they should be supplied with a detailed balance-sheet every week. A careful valuation should be made every year by a thoroughly competent and quite independent valuer; the expense attendant on this valuation (being specially for educational purposes) might be borne by the college, but no other item. There are

those who will say this cannot be done, and the statement may be true as far as they themselves are concerned; and it is fortunate they realise their own inability; but emphatically there are those who can do it.*

Thus far I have dealt with economic culture. In gardening, however, it is, fortunately, not always a question of economics, but sometimes purely of the artistic and useful. *L. s. d.* has not to be continuously to the front, spoiling the beauty and delights of gardening. Can we think of a more natural and delightful occupation than artistic gardening untrammelled by money matters? Health and beauty abounding, surely of all places a pleasant life may be spent in a garden, especially if one can work intelligently, knowing the why and wherefore. This happy lot falls to not a few highly favoured individuals, high and low, and fain would one dwell upon the happy scenes; but duty impels us to the economic side as by far the most pressing. Artistic gardening is, on the whole, well taught at the various institutions; and it is, of course, more fascinating than the economic.

Students proposing to enter an agricultural or horticultural institution would do well first to study elementary chemistry, physics, biology, mathematics, and drawing if they have not already some workable knowledge of these subjects, as much valuable time would thereby be gained.

Instruction in gardening, which is being given at various centres, chiefly villages, under the various County Councils, is doing good work, and is very highly spoken of, although there is room for great improvement. The work generally is much too superficial, perhaps necessarily so; but genuine enthusiasts should be willing and anxious to go a considerable distance, say to the nearest town, for advanced instruction; and if detachments from several surrounding villages could attend at a common centre, much longer and more useful courses could be arranged. This instruction would necessarily be during the winter evenings, and should be followed by spring and summer visits by the instructors to the villages, and, if possible, to each of the more earnest students' own garden. The peripatetic lecturer should try to induce the young to go to large centres.

There are serious weaknesses in the present systems. For instance, one hears of county exhibitions for prizes at which only those villages where a course of lectures has recently been given, and only those persons who have actually attended, are eligible to compete. A person who was known as an enthusiastic gardener before County Councils were in existence attends these courses, not, he states, really to learn—because he prefers his own methods to those advocated by the instructor—but in order that he may be eligible to compete. One wonders whether the authorities are afraid that those who have not attended the lectures should eclipse those who had. Education needs no such props. Let these competitions be open to all persons of the same status within the county or district and let both instructor and pupils see to it that in fair open competition they are not beaten.

In regard to school gardens so much has been said in their favour that it requires some courage to criticise. That they are an immense power

* Of course methods and practices which are suitable in one district are by no means necessarily so in another. The director should, however, show he can cultivate successfully in that district.

for good work no one can honestly deny. In this, however, almost everything depends upon the teacher. If he, or she, be an enthusiastic gardener, albeit an amateur, all will be well—very well. Give every possible encouragement and facility to such a school and such a teacher. But if the teacher be half-hearted—prefers not to teach the subject, or, even if he does not mind doing so, considers it immaterial—unless enthusiasm can be awakened I think it would be much better to leave out the subject at that school. Enthusiasm is in such cases much more likely to be engendered in the child's own garden than under such conditions. Moreover there is a great danger that these school gardens may monopolise too much of the child's precious time to the neglect of its general education. Connected with the work of school gardening is the much older subject to which the new name of "nature study" has now been given. As an introduction to an intelligent study of agriculture and horticulture this subject has great possibilities, although as a pioneer teacher of natural history and allied subjects I have to admit great disappointments with the practical results yet obtained. This is perhaps scarcely to be wondered at, when one considers the lines along which it has been developed. My ideas of what it should be may be outlined as follows:—

Let the senior scholars of our schools make a map of the district, say, the village; mark on it roads, paths, and places of interest which they know or can inspect. Let them note the kinds of plants which grow under cultivation, and more particularly the natural herbage, how plants grow, and any modifications under various conditions. Induce the children to write descriptive accounts of their own observations and so on. In this connection mechanical principles should certainly receive attention. Are two children see-sawing? Let the teacher show how a small boy can balance a big one, and from it deduce and show by proper application how a person can dig more easily and effectively if applying aright the principles of the lever. Is a horse drawing a load? Show the use of each part of the harness and what would probably happen under various conditions if a part were left unfastened or broken. Show the frightful difficulties under which farm horses often labour in drawing a heavy load uphill with a tight bearing-rein on. Show the effects of the common practice of hanging coats and other articles on one side of the collar of the horse. All such items I would include under the term "nature study," and all is calculated to interest and to instruct the child and to incline it towards a love of country occupations.

Turning to the last division—private effort. Before the compulsory Elementary Education Acts attempted to place the key of the Temple of Knowledge in the hands of every child there were those—there doubtless always have been—who by dint of perseverance have educated themselves. To-day the number of self-educated persons is probably very large. The early difficulties—the triumphs of these—have been and are not in vain. Can we stimulate many others to self-help, to private study? The kind of nature study which I have indicated is one means towards the end. Every effort should be made to induce children to love their studies, and thereafter to love their life's work. To this end I would insist upon a thoroughly good general education, not merely the three R's,

but at any rate, to some slight degree, the beginnings of the more advanced subjects.

At the present moment children are leaving village schools thinking they are good scholars, although many can scarcely write a letter, and comparatively few do so well. In their opinion they know too much to work, whereas a little more instruction would show them how ignorant they really are. Before leaving school I would, as far as its capabilities permitted, impress on the child or youth the utility of further knowledge and the most approved methods of gaining it. I would, as before stated, endeavour to induce him to love knowledge; but I would not attempt to force him. Show the results of industry and laziness respectively, and help him if he chooses the former. Wherever possible, continuation or evening schools should certainly be held. Subjects suitable to the district should, as far as possible, be taken and dealt with in an interesting manner. Make the young people if possible interested in their surroundings, but in no way try to restrict their knowledge.

To illustrate my point I will give one example—the outline of the career of an enthusiastic gardener living to-day. Born of parents who for generations had been connected with the cultivation of the soil, but who had an intense disfavour for book knowledge, the lad was kept frequently from school, and finally taken away altogether at eleven. He had entered employment before he was twelve. An innate love of gardening was soon apparent, and at an early age he distinguished himself by making floral decorations and showed a great love for flowers. Unlike most other boys sports had but little attraction for him; but on summer evenings flowers and other natural objects engaged his attention. By making the most of opportunities, notably by winter indoor study, he succeeded in improving his general knowledge. Thus at twenty we find him a fairly good general scholar, with some knowledge of mathematics and the classics. At twenty-four the importance of science applied to horticulture and agriculture was so very obvious to him that he wished to begin its study. Difficulties, however, appeared insurmountable. A complete ignorance of chemistry and physics impeded his progress. At length, through a casual acquaintance, a few assorted glass tubes, crucibles, and a few chemical reagents—costing altogether 2s. 10d.—were obtained, and, with the addition of jam-bottles and corks, all essential work was done. One prime difficulty may be worth noting. No gas or other means of bending glass tubes was available. He was a beekeeper, and had some discoloured wax. With the wide wick of a paraffin lamp fixed in an empty condensed milk tin and this wax a candle was made with which not only the tubes were worked, but also much other useful work done, only surpassed, indeed, seven years afterwards by the aid of the mechanical blowpipe in one of the best laboratories in the kingdom, where finally this enthusiastic lover of nature and gardening found himself as the result of a successful competition, and the reward of his dogged perseverance. That lad—now a man—passed through his years of college life with the highest honours obtainable, became a successful teacher—successful not only on account of enthusiasm, but also because he acted according to his views, and endeavoured to teach practically. As an instructor of horticulture he delighted not alone to explain, but also to do the work, until

informed by the "powers that be," or were, that digging, pruning, &c. as an ordinary labourer was beneath the dignity of a professor, our friend turned to economic culture on his own account, and, after many mistakes, became equally successful in this as in his former undertakings. And as the adviser to-day of a large circle of practical cultivators he calls to others to help forward the pioneer work. This career shows that, notwithstanding much opposition and many difficulties, perseverance can, and will, do much. I repeat, then, we must insist upon every child having a sound elementary education, with every inducement to pursue its studies—not in an early specialised form, but to enable it later to attain any goal within reach of its God-given intellect and its own perseverance.

Although such education may rob horticulture of a genius, it will create others. If our special subject be taught aright—if the dry bones of hard but essential facts be clothed with living muscle and nerve, quivering with vitality—showing the wondrous beauty and harmony of garden life—all will be well. Although we cannot agree to infantile specialisation, yet we doubt not the advisability of letting children, say of twelve years and upwards, take a part in useful work. A child of twelve, working with its parents in the hayfield or garden, will have its attention forcibly drawn to the stern realities of life—will begin to understand that knowledge is power, and the utility of knowledge. If its education be planned aright, school will have an increased interest for it. Full well I know the time required to revise work after vacations; hence, if possible, there should only be one long one in the year. Well I know the opposition to discipline which some long absent ones will present on their return; yet the time is not lost, even from an educational standpoint. Nevertheless, although I would give every facility for children to engage early in manual work, I would not reduce the educational requirements, but rather increase them. Our great hope is in the awakening of the masses. Children now attending village schools, young men working in gardens and fields, if these can be made to realise the importance of education as the means of raising them and their fellows to a higher level, to independence, to greater usefulness, a new era will indeed dawn.

True, the people are awakening. The franchise has put into their hand tremendous power. They want leaders—men of character, ability, and tact—men whom they can, and will, trust implicitly. Leaders will presently arise from their own ranks chiefly. Our chief concern is, however, to stimulate our youth to true nobility of character, to energy, to study. I would say to our young gardeners: Apply yourselves to your work and to your studies. Faint not. I know how hot the sun shines on the south border of a walled-in garden in July, the oppressive heat of a glasshouse. I know how keen a January wind often blows in the open; I do not forget the seductive tendencies which would lure the worker to a well-earned rest when the day's work is done. But I also know the intense satisfaction which accrues from the acquisition of knowledge, and I know that the earnest youth, after a refreshing wash and tea, has the opportunity to turn to mental studies, and that when once the preliminary difficulties are overcome he will be likely to desire to push on. I think of the intense gratification which the worker has

when examination results show that he has far out-distanced those who had splendid opportunities, but have let the grass grow visibly under their feet. I realise, too, that such work not only leads to independence—to ability to hold one's own in fair open competition—but will also, to no small degree, mould the course of our future national life. This aspect of our subject is of such immense importance that I would fain deal with it more extensively.

I will only add: Let our young gardeners carefully and honestly calculate the number of hours they really have for study, and then properly economise their time. While engaged in their daily work let their whole will and energy be devoted to it. This will give sufficient physical exercise, and will give them considerable knowledge of plants and other facts. These are great advantages which compare favourably with those of otherwise more favoured persons. Let them remember the greater the difficulty overcome, the greater the victory and the better equipped for after-battles of life.

In this connection I would urge our young people to avail themselves as far as they possibly can of the instruction now being given in the technical institutes. It may involve a journey of several miles once or twice a week during the winter, but it will be worth the exertion, especially if the rest of the available time be spent in private study. Let them not think that gardening classes are all they require. They will find that instruction in chemistry, physics, mechanics, botany, mathematics, freehand and model drawing will be almost as much, if not more, real use to them than superficial gardening classes; not that these should be neglected if they are fortunately available. If opportunity be found let them study literature and languages. German will, in time, open up to them a new field of study.

Of course they should endeavour by every means to improve their knowledge of their special subject, to become thorough experts; but, in addition, they will do well to take as many other allied subjects as possible. If near a large institution they should carefully arrange their studies so that the one leads up to the next. Employers and head gardeners should endeavour to facilitate the efforts of the young thus to improve their education; although they may not fully realise the immense importance thereof, let them think of the satisfaction which may be theirs if some of these young fellows in after-life come to express their hearty thanks for help received. Let them realise that their duty to their neighbours, their duty as citizens of Britain, demands this at their hands. In return let the youth show that the facilities are duly appreciated, and that education has stimulated the desire to do one's very best at one's duties; that they are no longer done in a merely perfunctory manner.

Examination results have been referred to. The value of examinations as tests is very frequently adversely commented upon, and with a considerable amount of justification. Admittedly the best students—those having the most satisfactory knowledge and cultural ability—by no means always obtain the top places. Examinations are apparently necessary evils, but generally speaking they stimulate to increased study. Teachers know well that students ask many more questions as the examina-

tion day approaches than at other times. Examinations should, however, be tests of real knowledge, and often leave much—very much—to be desired. Even the examinations of this Society are not ideal. The syllabus for the general examination, in particular, is much too long for a student's knowledge to be efficiently tested in three hours. The questions set are such that the race is to the swift writer who has had practice in writing papers, rather than to one who has a wide sound-knowledge of the subjects. A candidate in such an examination should have time to think before writing. The answers would then be more concise and correct. I would suggest that the examination be taken on two different evenings, and that three hours be allowed for each paper. Then I am convinced a more satisfactory test would be made. Let it be understood that I complain of no personal hardship, as eight out of twelve (or two thirds) of the whole of the medallists in the last twelve General Examinations have been through my hands at Swanley. The comment is made purely with a desire to render the examinations more useful.

The Board of Education's syllabuses in horticulture and allied subjects are excellent. The test papers are carefully set and ample time is allowed. A student who has duly passed first class through the required sections of Stage II. and distinguished himself in Honours should know something about his subject. I say "him," but as yet no man has obtained the coveted distinction. The Honours examination has only been held these last two years, and the only successful candidates have been our Swanley lady students. Let us hope some men will endeavour to obtain the laurels, and that the ladies will be equally determined not to be beaten. In the Honours there is a practical examination in a garden, and we may hope that a really searching test in manipulative skill and practical knowledge will be made by competent men, working in conjunction with the very able scientists who are now responsible for the examinations. Successful candidates should, however, remember that in Nature's infinite book of secrecy it is only a little they can yet read, and also that in all probability their manipulative skill and organising power are by no means perfect, and that they may be anything but successful practical cultivators, especially on the economic side.

We want a number of persons very highly qualified in science and general attainments, fully realising that they are but as infants in practical, or applied, agriculture and horticulture, willing to learn from the meanest worker—to divest themselves of coat and gloves, to work consistently and continuously through the entire routine. When they hold their own with the paid worker—and with practice it can be done, because applying their science at every turn they work at mechanical advantage—they may feel that they are competent associates of the at least equally well-equipped men who beginning life as workers have by dint of perseverance reached the same academic level. When such men take the leading part in horticultural education, are admitted into the Councils of the Boards of Agriculture and Education, into the committees and governing bodies of agricultural and horticultural institutions, and are co-opted by Council education committees, then we may hope for a great advance.

We usually refer to the gardener as he, but of late the ranks have been invaded by ladies. For nearly fourteen years I have had lady

students of gardening under my care, and have followed their subsequent career with much interest. There can be no doubt whatever that the lady gardener has come to stay. There is much that she can, or should, do particularly well. As florists, lady gardeners should excel, but they should do well in many other departments. As hybridists and raisers of new varieties their work should be of the best. Speaking generally, I find them harder workers than men, especially when working alone; but although physically weak, they do not apply their limited strength to the best advantage nearly to the same extent that their male competitors do. Moreover—I say it with halting breath—lady gardeners seem to have one or two other great failings. Not a few seem to be ever changing their ideas of an ideal. This, almost always unfortunate, is fatal to a raiser of new varieties and the more important work of gardening. The failing, however, which grieves one most intensely is that many, at any rate, appear to have but little ability to discriminate between sound prosaic advice and hollow poetic suggestions. Staid judgment is requisite in gardening. Their gentle, nimble fingers are wanted in the garden and glasshouse, and when experience has taught them wherein they fail they will triumph in their manipulative skill and organising ability as now they do in examinations.

A few comments on the history of horticultural education for women may be noted. In 1889 Swanley College was opened to give instruction to both men and women. During the earlier years good work was done under difficulties, probably altogether beyond the comprehension of some of the present authorities.

Several students of those early days are now doing good work. About four years ago the College was reserved for women students only. In 1898 Lady Warwick started an independent scheme solely for women, and this has developed immensely. The records of both these institutions are well worth consideration by all interested in the welfare of woman generally.

In connection with college work I have endeavoured for years to show the necessity of what may be termed an Information Bureau. Students who have passed through an institution should be encouraged to keep in direct touch with their *alma mater*. They should, especially before committing themselves to any new work or operation, if possible seek advice from those whose business it should be to help. For years I have made a point of inviting old students to apply for advice, and the large number of responses—while entailing a considerable expenditure of time—have generally been of mutual benefit, as the adviser has thereby become thoroughly conversant with the weaknesses and the strong points of the tuition given. This, however, is sometimes of doubtful personal advantage, as knowledge gained by experience frequently indicates the desirability of methods which are not in accordance with those of the powers that be.

I take this opportunity to urge that arrangements be made in agricultural and horticultural institutions to enable their old students to easily and promptly obtain advice. Gladly would I enlarge upon various schemes by which this could be carried out. Certainly the organisation and supervision should be by the authorities with the assistance of the Staff.

Reference has been made to the Boards of Agriculture and Education. The latter particularly is doubtless doing its best, and however faulty it may still be there has been an enormous improvement latterly. Would that there were included in the Council persons who know more thoroughly the difficulties and requirements of gardeners and farmers. Without doubt the Board of Agriculture is doing much good work, but that this department is badly in need of reorganisation no unbiassed person can, I think, honestly deny. Even the annual grants made by it for educational purposes are open to grave objections. It is difficult to understand the basis upon which the grants are made. Certain it is that these grants stifle a great deal of voluntary work. Persons who would help by their own labours hold aloof because they consider that this Board should do the work. When large sums of money are paid to institutions from the rates, and especially from imperial sources (as, for instance, a subsidy from the Board of Agriculture), persons of high academic rank, although they may have but little practical knowledge, obtain the more important posts, and though highly flattering reports may be made, those who know most wisely shake their heads. The educational work of the Board of Agriculture includes the publication and free distribution of pamphlets, which are very useful for students and amateurs, but are generally of comparatively little value to gardeners and farmers, and usually not up-to-date.

Doubtless many are the difficulties of the officials of the Board, and one can understand that unless there is a thorough knowledge of the details of actual requirements the results will not be for the best. It is with very great satisfaction that we hear of several movements in the right direction. If, as we may hope, these are indicative of reorganisation, or, at any rate, a desire to satisfy present-day needs, then every person should promptly drop old grievances and help on the good work. Hence the need of co-opted persons who really do know, and *who have the courage and power to assert their knowledge*. Information of an unimpeachable character is wanted before it can be imparted to others. Already there is a wealth of purely scientific information available (and fortunately this will increase more and more), but the disinterested, impartial work on the application of science to gardening and farming is very limited. How often do we have to content ourselves solely with the work done over the seas, or by that of private persons! Many of us await anxiously for the development of the work by this Society at its new experimental station at Wisley. If purely scientific problems be made subservient to the applications of science to gardening—more especially the economic side—then the work will deserve, and doubtless receive, the hearty support of all concerned.

Much of the present published experimental work should be recognised as specially selected results for purposes of advertisement, and instructors of horticulture and agriculture and cultivators generally need be very careful to differentiate between these and unbiassed reports. The requirements of cultivators will have to be recognised, or the masses will force the matter into prominence. Let me appeal to our public men to think well and seriously, not for the moment only, but for the years to come; not alone of sectarian strife, but for the true education of the

people—more especially in the rural districts. At present villagers may be loyal to their superiors, but they are rapidly awakening and kicking at they know not what. Educate them, show yourselves to be their true friends (insincerity will be fatal), not by doling out gifts, but by helping them to help themselves. Let the more brilliant of their children have every opportunity to rise in the social scale—to compete with well-to-do children (who must in turn be stimulated). Let the majority have a sound general education as well as a specialised one, and they will realise that the higher social positions are not always beds of roses, and they will serve you and your successors with true loyalty. Hinder or neglect the work of education now, and assuredly before us lies black night. That much of the land now lying derelict, or producing poor farm crops, may soon be brought into good garden condition, affording work for the masses and profit for the owners and occupiers, should be the devout hope of all.

To gain this end we require educated gardeners and labourers, not as, alas! they are now too often educated, but that they may clearly see the wisdom of doing their work as it should be done, and to do it willingly and honestly. And I urge those who can to help forward the work, but more particularly I urge our workers, gardeners, and other acting and intending cultivators of the soil to act for themselves; to do their part and delay not.

RESEARCHES AT WISLEY.

By G. MASSEE, F.L.S., V.H.M.

[Lecture given on November 20, 1906.]

BLACK CURRANT GALL MITE.

At the time these investigations were commenced, owing to the absence of a laboratory, it was imperative that the subjects selected for investigation should be of such a nature that the great bulk of the work could be



FIG. 36.—BLACK CURRANT SHOOT BEARING "BIG-BUDS." NATURAL SIZE.

conducted in the field. The black currant gall mite, or "big-bud" (fig. 36), was suggested and finally selected as the principal subject for investigation, the work being carried on at Wisley, with check experiments at home and

in other places during my holiday time, and proved a very pleasant change from the study of fungi, followed in my official capacity.

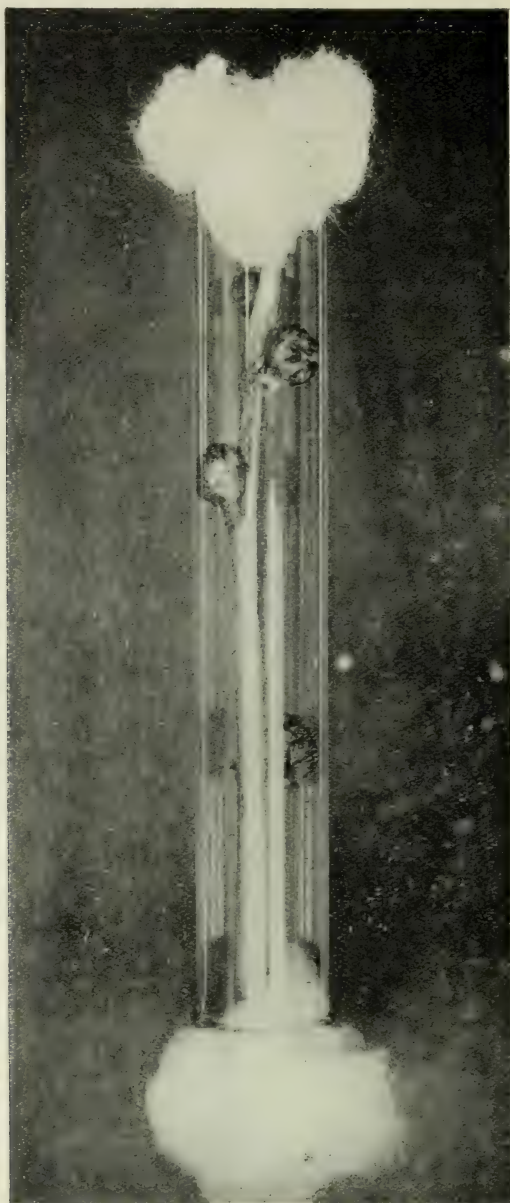


FIG. 37.—TEST-TUBE CONTAINING DISEASED BLACK CURRANT SHOOT.
NATURAL SIZE.

As a preliminary two batches of "Baldwins," one lot teeming with "big-bud," the other lot perfectly free from this disease, were procured and established at Wisley by Mr. Wright, the superintendent of the garden.

Much careful and valuable work bearing on the life history of the black currant mite has been done in this and other countries; such work, owing to incapacity, I neither attempted to extend nor to corroborate. My ideal was of a much lower standard, and was entirely confined to discovering some practical means for preventing the mites from injuring black currant bushes. It is for the grower of black currant bushes to decide whether I have been successful in this attempt or otherwise.

As a starting point it was important that I should become acquainted to some extent with the habits and mode of life of the creature against whom I was conspiring. I quite believe that all I observed, and more also, has been recorded before. Therefore I do not claim originality for any statement made; I only conducted certain experiments because it is both interesting and instructive to observe things oneself.

Experiment I.—Much valuable information as to the ways and doings of the mites can be obtained by placing a branch bearing a few "big-buds" in a cylinder of very thin glass, and plugging the two ends with cotton-wool (fig. 37). Within twelve hours the inner surface of the glass cylinder will be covered with a teeming multitude of mites, and, as the thin glass of the cylinder will permit the use of an objective magnifying four hundred times, the movements of the mites can be followed with ease and certainty. When in their best condition for walking—that is, soon after incarceration—the mites travel with amazing rapidity, passing across the field of the microscope in an instant. After being imprisoned for some days their movements become sluggish, and at the end of a week most of the mites are dead, but still adhering to the inner surface of the cylinder. In addition to the ordinary method of locomotion certain mites suddenly assume a vertical position, appearing as if they were attempting to balance themselves on their tails. While in this position the entire body sways slowly to and fro, describing a semicircle. After repeating this movement several times, if not approached by another mite, they suddenly leap into space out of the field of vision. If another mite approaches the two come in contact in the upright position, apparently a sexual act.

If a glass cylinder containing mites is immersed in crushed ice, those mites that are on the inner surface of the glass are killed within twenty hours, whereas mites that are in the buds remain alive after four days' exposure to such treatment.

Chloroform and ammonia respectively kill mites both on the glass and in the buds within twenty-four hours. This experiment, however, has no practical application.

The mites are almost colourless and very minute, rarely exceeding 100th of an inch in length (fig. 38).

Experiment II.—A black currant shoot having a terminal and two lateral buds, free from mites, was procured; two "big-buds" were carefully fixed to this shoot by means of "seccotine" below the lowermost healthy bud. The cut end of the shoot thus prepared was placed in water and the whole covered with a bell jar.

After an interval of twelve hours numerous mites had moved from the "big-buds" and were present on the shoot, and more especially in the axils of the healthy buds. On dissecting one of the healthy buds it was

found that no mites had penetrated into its interior, although after a period of twenty-four hours had elapsed numerous mites were discovered under the bud-scales of the terminal healthy bud. During the migration from diseased to healthy buds numerous mites were observed undergoing the peculiar swaying process described above, which suggests that fecundation is effected during the journey between old and new buds.

After the shoot had been under observation for three days a whitish streak, about a quarter of an inch long, appeared a short distance below the terminal bud. On examination under the microscope this streak was seen to consist of a dense assemblage of mites that had stuck fast in some sticky substance that had accidentally touched the shoot.

This discovery furnished the clue for all further experiments.

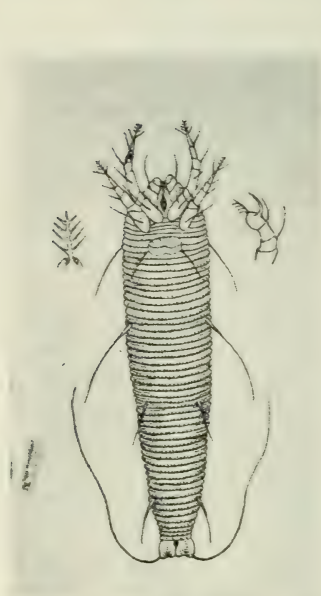


FIG. 38.—BLACK CURRANT GALL MITE, *ERIOPHES RIBIS*. HIGHLY MAGNIFIED.

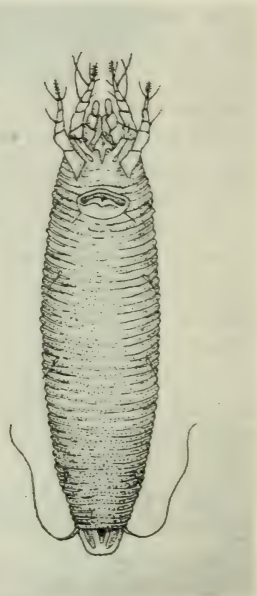


FIG. 39.—HAZEL GALL MITE, *ERIOPHES AVELLANEA*. HIGHLY MAGNIFIED.

Other healthy shoots to which "big-buds" were fixed with "seccotine" were procured. On one such a ring of vaseline, a quarter of an inch broad, was painted round the shoot between each "big-bud" and the healthy bud immediately above it. Myriads of mites were entrapped in the vaseline, but not a single mite succeeded in crossing the danger zone and reaching the healthy bud situated above. In another experiment the "big-buds" were thinly covered with vaseline; in this instance not a single mite escaped from the infected buds, as proved by their absence on the vaseline rings present on the shoot above the infected buds. Finally, rings of vaseline painted round a shoot both above and below each infested bud showed that the mites almost invariably *ascended* the stem, in the direction of the new and healthy buds.

It was observed that as soon as the mites left an old diseased bud they were very anxious to gain an entrance into another healthy bud, which

suggests that they are only quite at home when within a bud, and do not promiscuously take a walk on a twig for the sake of an airing. As it is practically impossible to destroy the mites when in a bud, it follows that they can only be destroyed when migrating from old to new buds, or by preventing their escape from the old buds.

Experiment III.—Strips of black paper coated with a thin layer of vaseline were tied round the main stem and branches at various points of a badly infected bush. Judging from the relative number of captures on the different traps, it was obvious that the mites knew exactly what to do when they left the old buds. What they did was to ascend the shoots in the direction of the new, healthy buds, the terminal bud being specially favoured by their presence. A band of vaseline paper fixed round the stem two inches above the ground line did not capture a single mite, proving that the mites showed no desire to voluntarily leave the bush.

The above experiments appeared to indicate a satisfactory solution of the problem I had attempted to solve; in fact, like most laboratory experiments, where every possible care is taken that all details necessary to ensure success are religiously carried out, they left nothing to be desired. However, knowing from past experience that successful laboratory experiments do not necessarily mean success when widened out to the extent of practical field work, it was considered necessary to test the idea that mites could be prevented from reaching healthy buds by the use of a sticky substance, by some method that could be practised on a large scale and at a moderate cost.

Having enlisted the practical sympathy of some friends, I merely suggested that grease or a sticky substance of some kind, not easily washed off by rain, should be brushed over the branches, leaving the choice of materials to themselves.

The substances used by these experimenters were cart grease, "palm oil" or the material used for lubricating the wheels of railway carriages; dripping. One person covered the diseased buds with thinned gas-tar. In my own experiments vaseline was used.

In every instance the method employed proved a success; a good crop of fruit was produced, and the greatest number of "big-buds" found on any one bush after one year's treatment was seven, not a single diseased bud being met with after the second year's treatment. All the treated bushes are perfectly healthy and vigorous.

For practical purposes vaseline would be too expensive, although it stands rain better than any other substance I have tried. The choice lies between cart grease and "palm oil," as defined above, which should be applied by means of an ordinary paint brush of the size known as a sash brush. The branch to be treated is held by the tip, and the brush, loaded with grease, is rubbed up one side, down the other, taking care to hit "big-buds," which need not be removed. This treatment should be applied early in the season, before the young buds begin to expand. If I had infested bushes, to make certain of permanent results I should make two applications of grease during the season, one about the middle of February and another the last week in April. However, as stated above, one application during the second week in March proved very satisfactory.

It has been stated that the mites are conveyed by birds from one bush to another, and I can quite imagine this to be so, although I have not been able to prove it. I have found mites on the bodies of aphides present on shoots bearing diseased buds, and have also counted seven mites on the body of a ladybird. There is, however, no possibility of the mites being dispersed by birds, insects, wind, or other agents, if they are prevented from leaving the infected buds, by the application of some viscid substance sufficiently early in the season.

Various comments have been made on the preventive method I have suggested.

(1) The application of grease in any form would prove injurious to the bushes. As a reply to this I have already stated that the bushes treated by the various substances enumerated for two successive years are still perfectly healthy and have produced good crops of fruit. The bushes treated with gas-tar afterwards produced the best crop ever seen by the owner, a man of experience. I should not recommend the gas-tar for use; at the same time the experiment is of value as showing what can be done. The reason why grease does no harm is probably due to the fact that the epidermis or skin of the shoots is shed under the form of a thin membrane, which persists for some time on the branches as a dead, loose covering before it finally falls away.

(2) The method, even if effective, would be too costly. I have worked this question out on a practical scale, and find that a person could, without any over-exertion, treat forty-eight bushes in ten hours (probably a much greater number could be thoroughly done). Now if we allow four shillings per day for labour and material, which is presumably much more than would be paid, allowing threepence for grease after a brush had been bought, the cost per bush works out at one penny. What the difference in profit would be between a bush bearing no fruit and the same bush bearing a good crop of fruit I have not been able to ascertain; but if we say a shilling, then even if two applications of grease, costing twopence, were applied there would still remain a profit, even during the first year.

(3) The method suggested is of very doubtful utility. This, as I have previously stated, can only be determined by persons growing black currants on a large scale. Personal opinion, unsupported by experiment, even when unbiassed, is of little or no value. If there is anything encouraging in the idea the present crude suggestions will soon be improved upon, and the only idea involved is that *mites cannot walk on grease without being held fast*. Probably some mixture that can be used as a spray—say, a mixture of fish oil and resin—will be found to answer the desired object.

BLACK CURRANT AND HAZEL GALL MITES.

The opinion is held by gardeners and others that mites from the hazel infect the black currant and produce "big-bud," and *vice versa*. To test this view from a practical standpoint a number of "Baldwins" very badly infected with "big-bud" were planted in a row with alternating hazel bushes free from "big-bud." The bushes are planted so near to each other that the currant and hazel branches are intermixed (fig. 40). A second batch of "Baldwins" free from "big-bud" was planted under

some overhanging hazel bushes teeming with "big-bud"; bunches of diseased hazel buds were also tied on to the shoots of the currant bushes. These experiments have now been going on for three seasons, and as yet no infection in either direction has been observed; in other words, the originally healthy hazels have not been infected by the diseased "Baldwins," neither have the healthy "Baldwins" been infected by the diseased hazels



FIG. 40.—HEALTHY HAZELS AND DISEASED BLACK CURRANTS AT WISLEY

(fig. 40). It is not suggested that these experiments furnish absolute proof that no infection of the nature suggested can take place, but as far as it goes the experiment is reassuring.

VINE LEAF MITE.

During certain seasons the leaves of outdoor vines are disfigured by the presence of numerous blotches on the under surface. These blotches are at first pure white in colour, gradually changing to a dark, rusty brown, and are due to the presence of a mite closely allied to those forming "big-buds" on black currants and hazels. This disease, known as erinosis, has occurred on the leaves of one of the vines growing in the field at Wisley, and requires to be investigated.

TOMATO BACTERIOSIS.

A bacterial disease of tomatoes often proves very destructive to the crop in the central and northern parts of France. The fruit of a single tomato plant grown at Wisley showed this disease, but prompt removal prevented its spread. Infection takes place when the plant is in flower, the bacteria being conveyed by insects and deposited on the stigma. Some time after an infected fruit is set a small black speck appears at that point of the fruit occupied by the stigma; this speck gradually increases in size until by the time the tomato is fully grown it is almost entirely black both externally and internally, and soon deliquesces into a pulpy mass teeming with bacteria (fig. 41).

If insects are excluded from a tomato house by means of insecticides there is a danger of the fruit not being fertilised, when it remains quite small and seedless. This danger is also brought about in some instances by keeping the house too damp, the pollen becoming sodden with moisture, and not reaching the stigma to effect fertilisation.



FIG. 41.—TOMATOES, SHOWING A BACTERIAL DISEASE, GROWN AT WISLEY.

In those districts in France where the disease is prevalent it is not difficult to account for the presence of bacteria that could be conveyed by insects for starting the disease; but where the bacteria came from that caused the disease at Wisley is a problem that has yet to be solved.

SEED FROM DISEASED TOMATO PLANTS.

An idea is prevalent amongst practical men that the use of tomato seed produced by diseased plants is attended with risk. This applies to the prevalent tomato diseases, "black rot" or "black stripe" (*Macrosporium solani*), "sleeping disease" (*Fusarium lycopersici*), and "leaf rust" (*Cladosporium fulvum*). If this condition of things were possible

it implies the presence of the mycelium of the fungus in the embryo of the seed, which, notwithstanding careful examination, has not been observed.

Practical experiments at Wisley have proved the supposed danger to be unfounded. Seed obtained from plants suffering respectively in a marked degree from each of the above cited diseases were mixed and sown by Mr. Wright, and the result was the production of sturdy plants bearing a good crop of fruit, perfectly free from disease of any kind whatever.

ACTION OF COPPER ON THE GERMINATION OF SEEDS.

Some short time ago a French scientist, Dr. Renard, announced that the germination of seeds was much accelerated by previous soaking in a solution of copper salt in the presence of a hydrocarbon. Seeds of turnip, radish, tomato, and other plants were treated according to this method, and sown in parallel rows with other portions of the same batch of seed untreated. Mr. Wright was unable to distinguish between the treated and untreated seed, either as to the period of germination or during subsequent development.

THE WEST INDIAN LIME (*CITRUS MEDICA* VAR. *ACIDA*).

By ARCHIBALD J. BROOKS, F.R.H.S.

[Lecture given on December 4, 1906.]

HISTORY.

(1) THE lime is the commonest species of citrus. It grows wild in the warm valleys of the outer Himalaya up to an altitude of about 4,000 feet, and occurs as a much branched thorny bush. It is a native of the East Indies and was probably introduced to the West Indian Islands in the sixteenth or seventeenth century. Atwood, the historian, speaks of lime trees existing in Dominica in the year 1791.

Dr. Nicholls in an account of the "Lime Industry in Dominica" contributed to the Demerara "Timehri," vol. ii.* p. 1, states: "To Dr. Imray belongs the honour of the origination of the new lime cultivation; but I must mention that soon after this public benefactor had established the lime groves in Dominica the Messrs. Sturge, quite independently and without any knowledge of Dr. Imray's experiments, set to work to establish similar cultivation in Montserrat."

Ober, writing on this subject in 1879 ("Camps in the Caribbees," chapter xi.), says: "Twenty years ago Dr. Imray conceived the plan of converting a poorly paying sugar plantation into an orchard of limes, and he thus made of a narrow valley, riven from gigantic rocks and strewn with volcanic boulders, a garden of profit and delight."

The lime is now cultivated extensively throughout these islands, chiefly for its juice and essential oil, which are shipped in large quantities from Dominica, Montserrat, Jamaica, and Trinidad. The juice is exported in its natural or "raw" state, or as "concentrated" juice, the latter being one of the chief sources of citric acid.

Six valuable articles of export are obtained from the lime, these being distilled oil, raw lime juice, concentrated juice, otto of limes, green limes, pickled limes. As it is my intention to deal with the manufacturing of each of these articles separately I will pass on to its cultivation. During the initial years of this cultivation Montserrat exported the largest quantity of juice, and in consequence is still regarded by the general public as the "home" of the lime; statistics, however, prove Dominica to be the principal island in the world with regard to this export. The exports of lime juice and essential oil from Dominica are of the annual value of £45,370; from Jamaica, £6,000; from Montserrat, £5,810. Dominica may thus lay claim to be the real "home" of the West Indian lime.

CULTIVATION.

The cultivation of the lime is very simple when compared with the cultivation of most fruits. It requires a light sandy loam soil with good

* Dict. *Economic Products of India*.

drainage, and an elevation of from sea-level up to 500 feet. It is propagated by seed which is sown in nursery beds. These beds are usually made 5 feet wide and 20 feet long, a corner of the field, sheltered from heavy rains and the midday sun, being chosen for this purpose. When the seedlings are large enough to handle they should be forked up and

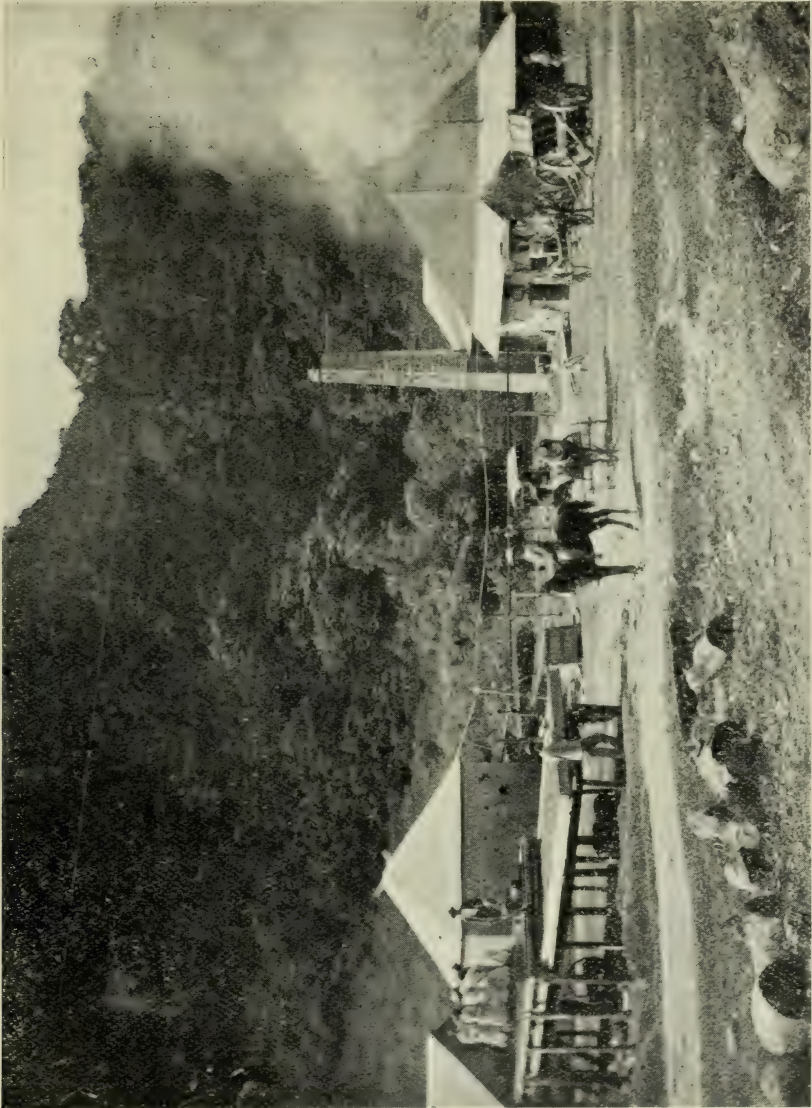


FIG. 42.—GENERAL VIEW OF A LIME ESTATE. COCOA DRYING ON TRAYS IN THE SUN.

the soil shaken from the roots. The tap root should then be cut back to about 2 inches in length: this stimulates the production of surface roots. The leaves should then be cut off, to prevent excessive transpiration. This may appear to be very harsh treatment; but it would be extremely difficult to find a more hardy seedling than the lime, and

if treated in this way and then carefully transplanted in suitable beds, 6 inches apart both ways, at least 98 per cent. will thrive vigorously.

In from ten to twelve months the plants should be a foot and a half in height; they are then planted out into their permanent places in the field at a distance of from 15 to 20 feet apart both ways. If the soil be poor 15 feet is the most suitable distance, the object being to just cover the ground, so as to reduce the cost of weeding to the minimum; by this method of planting 200 trees can be grown on an acre. A stake about 3 feet in height is placed near each young plant, to enable the labourers to see it when weeding. After the plants have been properly installed in their new quarters very little remains to be done as regards after-cultivation. The land is weeded from time to time, the weeds being mulched around the base of the trees. This is a point of great importance, and the results of mulching are very striking. Not only is plant food supplied by this practice, but the surface roots of the plants are kept cool and moist during the hot season.

In weeding some proprietors only weed a distance of about three feet around each plant. Where expense is a matter of vital importance this plan may be adopted with advantage; on the other hand, if the land is weeded throughout, catch crops can be grown until the limes commence to bear, and this has the additional advantage of admitting air to the roots. Some proprietors only weed once a year, and then only just previous to the ripening of the crops, but allow pasturage to grow between the trees into which they turn their cattle. This plan is not to be generally recommended, as considerable damage is often done to the young trees by the cattle treading them down.

The only cultivation required besides that already mentioned is an occasional pruning out of all dead wood; this is cut away and burnt, the wounds made being then tarred over. Suckers are also removed, as well as all branches lying near the ground, which would hinder the women in picking up the fruit. No further pruning is done, the plants being left to develop naturally.

YIELD.

The plant will bear light crops in five to six years, the full crop being borne in the eighth or ninth year, according to local conditions. The yield per tree varies considerably and depends chiefly upon the soil, elevation, exposure, rainfall, &c. A well-grown tree will yield from three-quarters to one barrel per annum, thus giving an average yield of, roughly, 175 barrels of fruit per acre. A barrel of fresh fruit will yield from seven to eight gallons of raw juice, and each gallon of ripe juice contains from twelve to fifteen ounces of citric acid.

MANURING.

As the plants increase in growth the fertility of the soil is kept up by judicious manuring. A method which is very largely adopted on lime estates in the West Indies is worthy of mention. All the skins taken from the mill, after the juice has been expressed, are carted to the cattle pens. The cattle thrive well on these skins and eat them with relish;

any skins that remain uneaten are trodden down with the manure. This manure is covered over each morning with a layer of dry grass, and allowed to accumulate until the end of crop time. The trees being then in greater need of nourishment, the pens are opened up and the manure carted to the land ; by this method the land suffers but little loss.

The flowering period usually begins about the middle of January, and gathering the fruit is carried on from June until the latter part of December, the busiest months usually being August and September. A light crop is borne all the year round, and it is impossible to visit a lime plantation at any time of the year without finding some fruit on the trees.

INSECT AND FUNGOID PESTS.

Like all other plants the lime possesses its natural enemies, the most troublesome being the Orange Mussel Scale (*Mytilaspis citricola*) and the Orange Snow Scale (*Chionaspis citri*) ; these, when living together, are capable of causing great destruction to the trees. In 1902 the lime orchards of Dominica suffered considerable damage from the ravages of these scales, which at one time seriously threatened the industry, many of the trees being killed outright and left as if bleached with fire. (Fig. 43.) The Imperial Department of Agriculture came to the timely rescue and recommended that all affected trees should be sprayed with rosin and whale oil soap compound.* This was at once taken up by the leading planters and proved very effective, the scale very soon being got in check and finally overcome.

These pests have made their appearance each dry season to some slight extent ; but if immediate steps are taken to give the trees a light spraying with this wash they do but little damage. The serious injury these pests did to the lime industry in 1903 is clearly shown in Table I. (p. 187), which shows a drop in these exports of £21,900. It is, however, gratifying to see also that the industry is now gradually regaining its former position, and there is no doubt that in the next two years, provided no similar disaster occurs, this position will not only have been regained but substantially improved.

Besides these scale pests there are two fungoid pests, which, although not so destructive as the former, prove very troublesome. The first and most common is known as the black blight, and is a fungus which lives upon the excretion of the shield scales, such as the Lecanium. As this pest owes its existence to the presence of these scales it is not difficult to deal with ; one spraying of rosin compound usually results in the destruction of the scales and the extermination of the fungus. The damage done by this fungus is due to its stopping up the pores of the leaves and shutting out the light. The second fungoid pest is a species of *Altenaria* which manifests itself by brown spots on the leaves. Light sprayings of Bordeaux mixture have proved beneficial in checking this pest.

* Imperial Department of Agriculture for the West Indies, Pamphlet Series, No. 7, p. 26.

FRUITING.

When the fruit has reached maturity it quickly ripens, turns yellow, and falls to the ground. Gangs of women are sent into the fields at 7 A.M.



FIG. 43.—LIME TREES KILLED BY SCALE INSECTS IN 1902 AND 1903.

each day (fig. 44), where they work until 5 P.M., collecting the fallen fruit in baskets, and carrying it on their heads to the nearest road, where it is

emptied in heaps ready for the women to extract the essential oil previous to its being carted to the mill.

There are many advantages gained by only collecting the fallen fruit, one of the chief being that it enables the proprietors to obtain a more

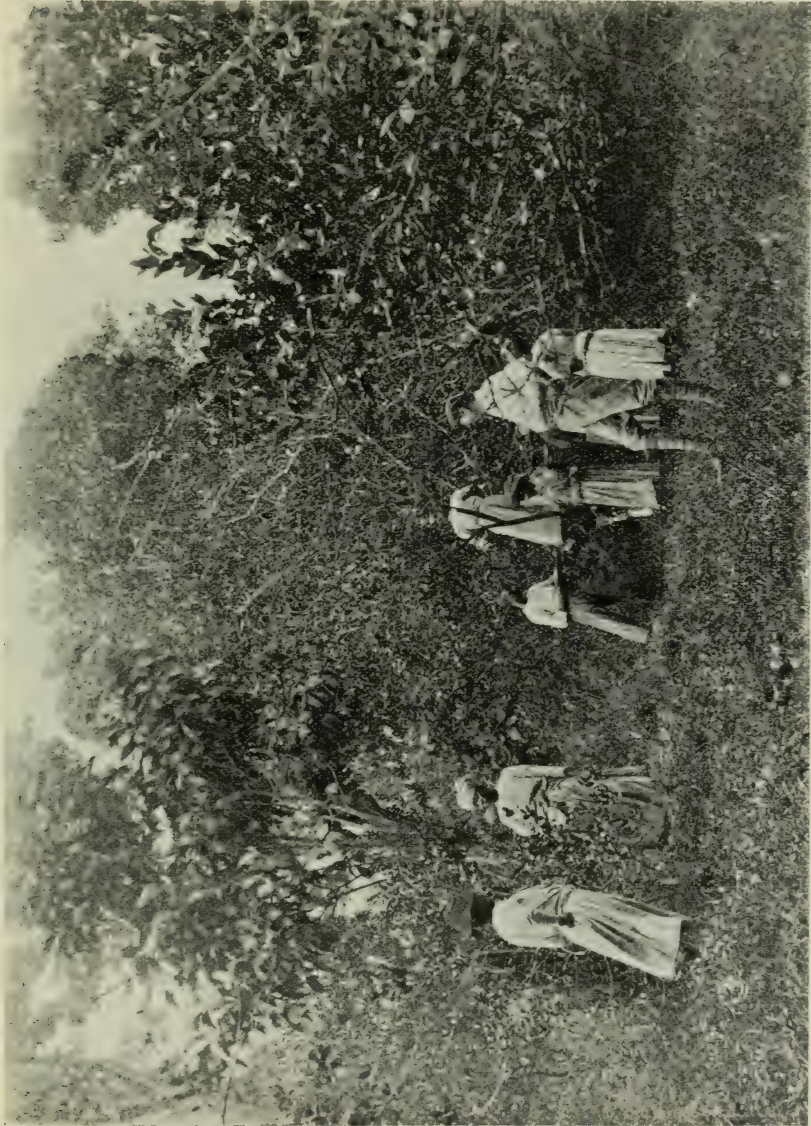


FIG. 44.—CLEANING THE LIME TREES IN DOMINICA.

uniform juice, as by this means only ripe and mature fruit is made use of, whereas if the fruit was plucked from the trees it would take a considerable time, owing to the many spines, and fruit of all stages of ripeness would be mixed together, and the trees more or less damaged by the operation.

ESSENTIAL OIL.

Women, provided with machines called *écuelles*, proceed to extract the essential oil from the rind. The *écuelle* is a shallow copper basin about 10 inches in diameter, having a lip for pouring on one side and a closed



FIG. 45.—SHOWING THE PROCESS OF EXTRACTING THE ESSENTIAL OIL WITH MACHINES CALLED ÉCUELLES.

tube at the bottom about 6 inches long and 1 inch in diameter. A number of brass pins stand up about $\frac{1}{2}$ an inch from the bottom of the vessel. Into this machine the limes are placed singly, and rolled rapidly with a circular motion over the brass pins, at the same time exerting sufficient pressure to rupture the oil cells, but not enough to squeeze out any of the juice. The oil then runs down between these pins and collects in the long tube which serves as a handle, which, when full, is emptied into a bottle, that it may be separated from the watery liquid mixed with it.



FIG. 46.—CARTING LIMES TO THE MILL.

(Fig. 45.) An expert woman can extract from 30 to 36 ounces of oil per day. The yield of essential oil averages about 3 ounces per barrel of fresh limes, and is worth in London about 4s. per pound. This oil, or "essence of lime," as it is called, is shipped to England in copper drums, and is chiefly used for perfumery. After the essential oil has been extracted the limes are thrown up into waggons, drawn by oxen, and conveyed to the mill for crushing. (Fig. 46.)

Distilled oil is obtained by distilling the raw juice in the usual manner, and is worth 1s. 9d. per pound.

RAW JUICE.

Upon reaching the mill the limes are emptied out upon a concrete floor, where the unsound fruit is carefully sorted out and put on one side. The sound fruit is then thoroughly washed before being passed through the mill. (Fig. 47.) The washing completed, the limes are then placed in a carrier and passed through the mill, which consists of three heavy rollers. In passing through the mill the fruit receives two squeezings; the rollers are so arranged that only about two-thirds of the juice are expressed in the first squeezing, thus ensuring a greater freedom from mucilaginous matter. This is called the "first juice"; and after it has been passed through

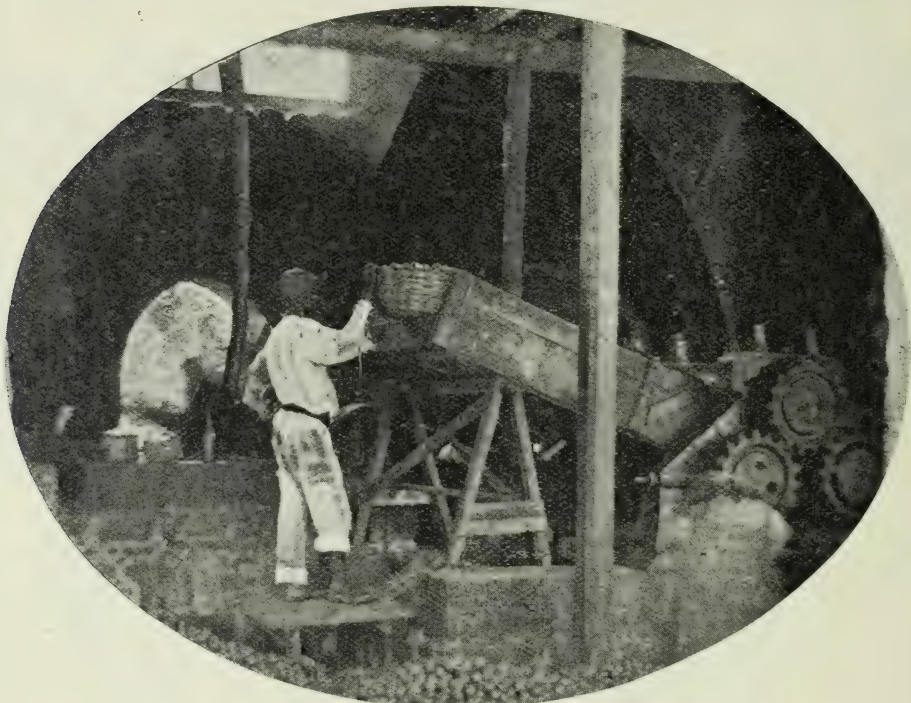


FIG. 47.—FEEDING THE MILL.

several refining wire sieves of different gauges it is run off into puncheons and quickly bunged up, so as to prevent decomposition. It is then ready for shipment, and upon reaching England is used for the manufacture of the well-known "Cordial." When the limes have passed through the mill they are again subjected to a third squeezing. This time they are thrown into a large screw cider press, in which the remaining juice is extracted, the lime finally emerging almost dry.

CONCENTRATED JUICE.

The mucilaginous matter separated from the juice in straining is emptied into long wire bags and hung up and allowed to drain into buckets. This juice, with that obtained from the cider press, is added to the "second juice" and then poured into copper vessels over an open fire

and boiled to one-tenth of its bulk, 10 gallons of "raw juice" being required to make 1 gallon of "concentrated." When the juice is reduced to this stage it is of the consistency of molasses and black in colour. It is then shipped to England in hogsheads—52 gallons—for the manufacture of citric acid. One gallon of concentrated juice of this consistency contains about 100 ounces of citric acid.

CITRATE OF LIME.

There is little doubt but that it would be a distinct advantage to all parties concerned if the exporters of concentrated juice would convert their "raw juice" into citrate of lime. Citrate of lime is the first step in the manufacture of citric acid; and although the operation itself is a little more difficult it is not so complex that a man of average intelligence cannot successfully perform it. Briefly described the process consists of, first, neutralising the raw juice with fine chalk, care being taken to avoid an excess of chalk, which would precipitate constituents of the juice that cause the fermentation of the citrate and the production of calcium acetate and butyrate. The mixture should then be heated gently, until the "citrate" becomes crystalline, when it rapidly subsides, leaving a clear liquid above, which should be siphoned off. The citrate, which is insoluble in hot water, but soluble in cold, should be freely washed with hot water, to remove impurities, and then strained. When draining is complete it should be subjected to pressure in linen bags, to remove as much water as possible, and then thoroughly dried in some suitable apparatus. This drying is one of the most important points; should the citrate not be thoroughly dried it will ferment, thus losing its citric acid and leaving only carbonate of lime.

The manufacture of citrate of lime instead of concentrated juice is bound to pay the planter in the long run. Although it means the laying out of a little capital in the initial stages, to adapt his present works to this later manufacture, he will soon be repaid by the saving in the loss of citric acid during the preparation of concentrated juice, and greatly reduced freight on less bulky and expensive packages.

Since writing the foregoing the manufacture of citrate of lime has been taken up by the proprietors of the Bath and Emsall Estates. The initial experiments were attended with such marked success that the firm felt justified in erecting a suitable plant for the manufacture of this product on a commercial scale.

During the last few months forty-four tons of this product have been shipped, the test obtained being 69 per cent. of pure citric acid against the Sicilian standard test of 64. In view of the decided preference for this article by the manufacturers of citric acid there is little doubt that in a few years this product will be the only form in which lime juice will be exported for this purpose.

GREEN LIMES.

Green limes are now becoming better known in England, and the superiority of the lime squash to the lemon squash is being appreciated; and as a result the demand for fresh limes is rapidly increasing.

In 1904 green limes to the value of £6,853 were exported from Dominica alone. The bulk of these were, however, shipped to New York. Since the inauguration of the R.H.S. Colonial Fruit Shows, where this fruit has been so well exhibited, many inquiries, and orders amounting to several thousands of barrels, have been received from leading firms at home for this fruit; and so long as exporters exercise care in packing only sound and uniform fruit this demand will continue to increase; for once a person has tasted a squash from a really good lime, lemon squashes will go out of favour.

The same care is exercised in gathering and packing the green limes as is taken in the case of oranges. Only mature fruits are gathered, and every care is taken to prevent the rind from being bruised, and thus damaging the oil cells. After being gathered they are carefully selected and graded, and each fruit wrapped separately in coloured tissue paper, and packed in small well-ventilated crates, thus forming a very neat and attractive package. Green limes first appeared on the list of exports in the year 1886, when fruit to the value of £34 was shipped. The annual value of this export has now risen to the amount of £6,196.

PICKLED LIMES.

There is also a fair demand in the New York market for pickled limes. The ripe limes are soaked in sea water for some time, the water being changed from time to time, and finally shipped, in a strong solution of brine, in hogsheads. The first record of "pickled" limes being exported appears to have been in 1878, fruit to the value of £68 being shipped. In 1906 this product reached the value of £606.

PRESERVED PEEL.

Attempts have been made to preserve the lime skins after the extraction of the juice, the first attempt having been made as far back as 1874, some few years before essential oil, pickled or green limes were exported. The trials, however, did not prove a successful venture, the skin being too thin for this purpose.

INDUSTRY.

Having now dealt with the cultivation of the lime and the manufacture of its products I will briefly review the progress of this industry from its commencement in 1848 to the present date. In doing so it is my intention to confine my remarks to Dominica alone, as this island exports three-quarters of the total crop of the whole of the West Indies.

During its initial years this industry could not be considered a reliable one, as is clearly shown by referring to Table I., where it will be seen that sometimes three or four years intervened between shipments.

Lime juice first appears on the lists of exports in the year 1848, when juice to the value of £282 was shipped, the annual value of this export now being £45,370. The great progress made in this industry is shown year by year in Table I., appended. The industry appears to have suffered only one serious check in its rapid progress, this being in

1903, when the exports dropped from £45,370 to £23,470, a decrease entirely due to the attacks of the scale pests previously mentioned. It is, however, very gratifying to see that the former position has almost been regained, and it is generally expected that this year (1906) will see this industry well above the hitherto maximum figures.

The rapid progress this industry has made during the last ten years is in no small measure due to the assistance rendered by the Imperial Department of Agriculture, which through its local Botanic Station distributes lime plants at 1s. per 100; thus for £10, sufficient plants can be obtained to plant 100 acres of land. Since the inauguration of this department, the annual distribution of lime plants from this station alone has been thirty odd thousand, and this year the distribution will be 65,000, and even this will not meet the demand. Valuable services were again rendered by this department in successfully checking the scale attacks in 1902 and 1903.

Owing to the rugged configuration of this island it is very difficult to estimate the total acreage of the lime cultivation; but by taking the total value of exports for the year 1902 and reducing it to barrels of fruit, and adding to this the number of lime plants distributed from the Botanic Station during the last six years, one can by a simple calculation arrive at a fairly accurate result; and upon this basis the total lime cultivation in Dominica at the present time is roughly 2,500 acres, of which number only 1,500 is bearing; therefore in the next five or six years, granting the prices of juice remain constant, the value of this export should be practically doubled. This year has been a most successful one to lime-planters, the prices having risen higher than has been experienced for many years past, the price at the time of writing being £25 per pipe, as against the usual £12 and £15.

IMPROVEMENT OF THE LIME.

In conclusion I might mention that there are two recent "sports" of the ordinary spiny lime. The first, known as "Spineless," was obtained from a plantation in Dominica in 1892. A plant growing on an estate was noticed to be free from spines; seeds were sown from this plant and 75 per cent. came true.

Although this variety has been named the "Spineless" lime, it is not in this respect alone that it differs from the ordinary spiny lime, as will be seen by the following description.

Description of Fruit and Tree.—Fruit elliptical or nearly round, little or no apical nipple, having the form and appearance of the ordinary lime; size small; average long diameter $1\frac{5}{8}$ in.; average short diameter $1\frac{1}{8}$ in.; average weight 40·78 grams ($1\frac{3}{4}$ oz.); average water displacement 41 c.c.; colour, very dull pale yellow; surface smooth; rind very thin, less than $\frac{1}{16}$ th of an inch; contains little or no oil; segments 8 to 10; membranes tender; axis small $\frac{1}{8}$ in. to $\frac{3}{16}$ th of an inch in diameter; seeds few, from two to three; pulp tender; exceedingly juicy; light greenish colour; acidity superior to that of the ordinary lime. Tree of a more erect habit than the ordinary lime; vigorous and very prolific.

The Hon. Dr. Francis Watts, C.M.G., recently tested the acidity of

the juice of this variety, together with that of the ordinary lime and the Sicily lemon. The results are given below :—

	Ounces per gall.	Grains per oz.
Spineless lime	13·80	37·73
Ordinary „	13·22	36·15
Sicily lemon	11·05	30·22

It was thought at first that this variety would do admirably to supply the green lime trade, inasmuch as it was devoid of spines, and would therefore enable the fruit to be gathered much quicker and with less damage to it; on the other hand, however, the mere fact of there being no danger of being pricked by spines would, I believe, tend to make the labourers less careful in the gathering of the fruit, to the detriment of the tree.

A recent report on a barrel of this fruit forwarded by the Atlantis Fruit Company to F. S. Maynard & Sons, New York, while acknowledging it to possess many advantages over the ordinary lime, does not recommend its use in the green lime trade.

This report reads as follows :—

“The lime is very juicy and thin-skinned; the colour appears to be very much against it. We would not advise raising this colour lime for marketing in the green state, but for juice we think it would be a splendid article, having, we should say, 25 per cent. more juice than many other varieties of limes at least, though the best lime to carry is the one with the considerably heavier skin, which gives it keeping qualities.

“We find they have very few seeds comparatively and very thin skin—in fact, so thin that many were dented, we might say, and shrivelled somewhat. We would not advise shipping these limes to us for marketable limes, as the trade prefers bright stock.”

The comparative amount of juice from fruits of the same volume is as follows :—

Spineless lime	25·3 c.c.
Ordinary „	24·1 c.c.

This “sport” has now become “fixed,” some 12,000 odd plants of this variety having been raised and distributed by the Botanic Station during the last five years.

The second “sport” referred to is known as the “Seedless” variety, which appears to have been noticed in Trinidad and Dominica about the same time. Scions of this variety were secured and budded on suitable stocks, and a few plants have now been obtained for distribution. From a scientific point of view this “sport” is of some interest; but from a commercial standpoint it is practically valueless, its very means of propagation debarring it from general use, as it entails more time and expense than the average planter can afford.

The improvements just mentioned have been brought about by natural agencies, and it has often been a matter of some wonder to the writer why so little attention has been given to the improvement of this fruit. That there is room for improvement cannot be doubted when one sees the various kinds of this fruit growing in the same field. Some have thick

rinds with little juice ; again, some are found to contain from five to ten seeds, whilst others possess but one or two ; again, some are perfectly round and smooth in outline, whilst others are lemon-shaped, possessing very coarse rinds.

If these different varieties were carefully worked up, and their qualities noted and named, it would then be possible for planters to make a selection of named varieties and plant only those trees which possess qualities most suitable for their special purpose. We have at the present time some dozens of named varieties of oranges, all possessing different qualities and growing true to name ; and what has been accomplished with the orange can be accomplished with the lime.

It is very gratifying to know that some slight attention is being given to this matter by so able a department as the United States Department of Agriculture.

I am greatly indebted to Mr. Herbert J. Webber, officer in charge of the Plant-breeding Investigations of the United States Department of Agriculture, for a copy of a paper in which he describes the results of his labours in this direction.

Mr. Webber states :—* “ Out of eighteen hybrids of West Indian lime, with pollen of Sicily lemon, sixteen of the seedlings show only lime characters, while two show by their foliage a true effect of the hybridization. Neither of these true hybrids has fruited ; but the majority of the sixteen false hybrids, which show no effect of the hybridization, have fruited.

“ Some of the hybrids between the West Indian lime and Sicily lemon, which are true limes in all characters, are excellent fruits, and, while other seedling limes can doubtless be found which are just as good as those, it is thought desirable to name two of them which are believed to possess characters of merit.

“ One of the hybrids selected gives uniformly a small fruit, while the other has a rather large fruit for a lime, approaching the size of an ordinary lemon.”

The former has been named ‘The Palmetto Lime’ and the latter ‘The Everglade Lime.’ Mr. Webber does not suppose “ that these varieties are superior to some of the seedling trees which could be found in various places, but there are very few named varieties, and these are simply two good limes that can be propagated from with a knowledge of their characters.” These new varieties will doubtless be watched with great interest by lime planters.

Much improvement may be made by careful selection, propagating only from seed obtained from the fruit possessing the best qualities. This is a work in which all owners of lime estates could greatly assist, and the results in a few years’ time may be far-reaching. The object to be obtained should be the production of a lime of a good size, say about 19 cm. ($7\frac{1}{2}$ inches) in circumference or 5 cm. (2 inches) in diameter, round in outline, possessing a thin, smooth rind, full of juice, rich in citric acid, and containing not more than two seeds. All this and more is possible by careful breeding, requiring but patience, skill, and time on the part of the operator.

* U.S. Department of Agriculture.

A late-fruiting variety is greatly needed to supply the increasing demand for Green Limes. Planters interested should ever be on the watch for a tree possessing this characteristic; and if such a one be found, seed from this fruit should be sown in beds separately and not mixed with other seed; the plants raised should be carefully watched during their development, and as soon as any are noticed to be developing unsuitable qualities for the object desired they should be destroyed and only those retained which give the greatest promise of success.

The operator should not be discouraged if the whole of his desired improvements are not obtained with the first generation, but he must be content to bring about the desired improvement step by step.

The following are a few of the ways in which the lime may be used, and I am greatly indebted to Miss Macintyre for the following receipts:

LIMEADE.

To one tumbler of water add a tablespoonful of sugar and the juice of one lime—the rind should be removed before squeezing—a tablespoonful of melted guava jelly and powdered ice.

LIME SQUASH.

The juice of one lime, one tablespoonful sugar, one bottle soda water; pounded ice. A cool and refreshing drink.

LIME PUNCH.

Dissolve one dessertspoonful of sugar in a third of a tumbler of water; add the juice of half a lime, a small piece of the rind, one wineglassful of rum (or whisky if preferred), and fill up with pounded ice.

LIME JELLY.

Soak the contents of one packet of gelatine (about 2 oz.) in half a pint of water and stand for one hour, then add a pint and a half of boiling water, six ounces sugar, and the juice of three limes and the rind of one, a little colouring; then boil for five minutes, strain, and allow to cool; when cool place on ice until set. In very warm weather a little less water should be used.

PRESERVED LIMES.

Pick the limes when young and place them (whole) in sea or salt water until they turn yellow (in about three days), then put them into a "greening pan" over a fire; when they are of a nice green, remove the pan from the fire, and when cool cut the limes into halves and throw them into cold water and remove the pulp from each with a small spoon, wash and boil until tender, then drain and put into a jar. Boil a syrup to a thick consistency, and when cold pour into the jar enough to cover the limes, cover closely, and set aside. The syrup will have to be changed three times.

LIME LEAVES.

The small leaves of the lime are used for perfuming the water in finger bowls, a few being put into the water and bruised by squeezing between the fingers previous to use.

TABLE I.

TOTAL EXPORTS OF LIME PRODUCTS FROM DOMINICA FROM 1848 to 1906.

Year.	Exports.	Year.	Exports.	Year.	Exports.
	£		£		£
1848	282	1868		1888	7,909
1849	125	1869	186	1889	8,061
1850	No record	1870	72	1890	10,107
1851	" "	1871	170	1891	10,172
1852	" 105	1872	691	1892	11,683
1853	No record	1873	738	1893	15,505
1854	92	1874	1,600	1894	12,980
1855	60	1875	1,823	1895	14,995
1856	68	1876	1,834	1896	19,833
1857	12	1877	1,673	1897	18,892
1858	26	1878	2,337	1898	24,844
1859	No record	1879	3,157	1899	32,274
1860	14	1880	4,018	1900	36,048
1861	—	1881	6,427	1901	35,164
1862	—	1882	5,249	1902	45,370
1863	—	1883	4,795	1903	23,470
1864	—	1884	3,598	1904	29,051
1865	—	1885	3,602	1905	40,001
1866	31	1886	5,267		
1867	33	1887	8,655		

This table includes raw and concentrated juice, essential oils, green and pickled limes, and preserved peel and citrate of lime.

TABLE II.

DETAILED LIST OF LIME PRODUCTS EXPORTED DURING THE YEAR 1906.

Distilled lime oil	3,742	galls.	£ 2,245
Expressed lime oil	964	"	771
Fresh limes (fruit)	17,702	barrels	6,195
Pickled limes "	1,615	"	605
Lime juice, raw	174,532	galls.	4,383
" " concentrated	126,471	"	25,324
" " cordial	222	"	27
Citrate of lime	733	cwts.	2,586
			<u>£42,136</u>

TABLE III.

SHOWING THE ANNUAL DISTRIBUTION OF LIME PLANTS FROM THE BOTANIC STATION FROM 1890 to 1906.

Year.	Plants.	Year.	Plants.
1890	00	1899	24,605
1891	5,186	1900	46,081
1892	9,950	1901	38,075
1893	7,150	1902	40,570
1894	5,250	1903	24,904
1895	2,500	1904	23,429
1896	6,200	1905	51,376
1897	11,895	1906	65,000
1898	11,824		

At the close of the lecture Sir Albert Rollit said the paper was an excellent illustration of the Fruit Show in the hall below as regards the

exhibit from the West Indies, and especially that from Dominica. Both the paper and the Show indicated the regeneration of the West Indies, one of our very oldest colonial possessions. Formerly the islands were practically dependent on the sugar crop, and a staple trade was always dangerous. There was safety in variety. Of this there could be no better illustration than the Portuguese island St. Michael, which was once a great orange-growing centre, but the industry declined, though it is now reviving.

He should also add that the West Indian Islands had not only staked everything upon one product, but they had not been quite up to date with their competitors as to modern machinery and appliances. Still this was now greatly improved, and nothing was more welcome than shipments of produce from the West Indies, especially when they were so excellent as those in the Show. He knew well one rival of the West Indies, which was indeed quite close to them, Florida. There the oranges, as in the West Indies, and the pineapples grow under a wide open lattice, and, protected by wood fires, which had to be lighted only three or four times in a normal season, were among the finest in the world. He had himself grown many of the Citrus fruits in Yorkshire under glass; and pines and lemons, tangerines, grape fruits, &c. could be so grown in plenty and perfection; but edible oranges were much more difficult to fruit well. And the beauty of such products is hard to excel in their florescence and scent (which are now too often sacrificed to other qualities), and in the appearance of the fruit; while the commercial importance of the fruit of the lime could not be overestimated, inasmuch as the supply of it to sailors as an antiscorbutic was a statutory obligation in the mercantile marine. The paper contributed much extremely useful and interesting information, and he moved a most hearty vote of thanks to Mr. Brooks for the trouble he had taken in its preparation.

NOTES ON SOME CORNISH GARDENS, AND ON SOME WILD
PLANTS GROWING ABOUT LAND'S END.

By A. WORSLEY.

THE following notes were made during a visit to Penzance in April 1905. I explored the coast from Praa Sands to Land's End, and for several miles inland. The principal private gardens visited were those of Mr. I. B. Bolitho at Trewidden, near Penzance, and of the late Colonel Tremayne, at Carclew, near Falmouth.

The vegetation generally in Cornwall and the Plymouth district seemed about a fortnight in advance of London, but, in the extreme south-west, did not seem quite so far advanced as in the Fal valley.

Those visiting Cornwall at this time of year cannot fail to notice the blazing lines of yellow provided by the wide untrimmed hedges of gorse. The agriculturist from the eastern counties would be driven wild by hedges of this kind, often 15 to 20 feet in width; and, indeed, it does not appear that land can be of any great value, if so much waste of space is tolerated. I noticed at least two distinct colour varieties, the one orange and the other canary-yellow, with every intermediate shade of yellow. Some of the forms had very large and fine flowers, and many were inconspicuously double; yet it is surprising to note, in districts where the gorse thrives so well, a complete absence, even in gardens, of the beautiful double form, which is one of our best "park" plants. The broom was also in flower, but did not seem common.

It has been well said, in comparing the Cornish coasts with other parts of England, that "there all our shrubs are trees, and all our trees are shrubs." Certainly there is nothing that a forester would call "wood" about Penzance. Whether big wood ever did grow there or could grow there is another question. I have little doubt that, owing to absence of coal, every scrap of hard wood was cut down years ago to keep the numerous smelters going, and it is well known that in a country once deforested, and exposed to the violent gales which rage in Cornwall, reafforestation is a very slow and difficult business. The moment a tree gets its head up, it meets the full sweep of salt-laden gales, and suffers accordingly. If it is possible to reforest the south-west of Cornwall, it will certainly never be done unless the Government lends assistance.

It is otherwise in the valley of the Fal, where fine trees abound in some parts, and where the growth of some of the shrubs is equally remarkable. I walked erect underneath the boughs of some of Colonel Tremayne's rhododendrons, which towered up to a height of fully 30 feet.

The gardens at Trewidden are noticeable for the glorious golden hues of many garden varieties of Coniferæ. Yet, as most if not all of these plants have been raised from cuttings or layers, they will never attain the majestic proportions that seedlings might reach.

I expected to note some interesting wild plants on the rocky island of St. Michael's Mount, to which it was stated that the public were admitted when accompanied by guides employed by the owner. However, such statements proved illusory, and the day I gave up for this quest was wasted; for, having waited over an hour for the privilege of landing, the guide said nothing could be seen but a church; on the way to which I noted *Arum italicum* and *Narcissus biflorus* (the latter in flower), besides a number of garden narcissi "naturalised" in the grass.

In the Morrab Gardens, Penzance, many of our summer bedding plants remain out all the winter, such as pelargoniums, marguerites, cannas, &c. Yet the climate is too wet for pelargoniums to flourish. A narrow-leaved *Agapanthus* (*A. u. Mooreanus*?) and an *Hedychium* (*H. Gardnerianum*?) are also hardy, but not in flower during my visit. These gardens have to contend against a poor soil, besides other drawbacks.

I did not visit any nursery gardens during my stay in the county.

What struck me about such gardens as Carclew and Trewidden was not so much any spectacular or planned effect as the way in which sheltered nooks and glades in the surrounding woodlands had been used for naturalising all kinds of plants, shrubs, and trees. Such gardens as these have surely been laid out by lovers of plants, not by showmen. Yet the impression such gardens give is the more pleasing, because their beauty is not in any way curtailed by formality. I do not hold that the formal garden should necessarily be banished from its proper position by the house, but this is not the real garden; rather is it a concession to those who are not devotees.

CLIMATE.

At Trewidden, which cannot be more than 200–300 feet above Penzance, some conifers (especially species of *Picea* and of *Abies*) lose their leaders and their beauty of contour through some cause. I was informed that frosts occur almost yearly in May at this altitude above the sea, although the absolute littoral is exempt. I am doubtful whether this is the real cause of the damage, because such frosts, if they do occur, must be very slight. I noted that *Tropæolum majus* had wintered out practically unharmed with no more protection than the thin partition-wall up which it had rambed, and that some of these plants were fully two years old: hence it is evident that this period at least had passed with not more than one degree of frost at the outside.

I also noted that the Coniferæ about Penzance were not appreciably more forward for the time of year than they are in the London district. The earliest of them were only just opening their leaf-buds on April 20. Hence the mildness of the climate does not appear to cause precocious growth in the Coniferæ, and consequent damage by frosts which would be otherwise innocuous. I incline to trace this damage to the effects of the salt-laden air on the young foliage of some trees.

All plants mentioned in these notes were planted out in the open ground, except where specially noted as under glass or on walls.

TREES.

Eucalyptus globosus: I noted a fair specimen or so, one about 50 feet high. But I cannot admire this tree. If it is beautiful anywhere, it is not in this country.

The following conifers, among others, succeed well at Carelew, viz.

Pseudo-Larix Kämpferi.

Taxodium distichum.

Ginko biloba (80 feet high).

Picea morinda (syn. *Picea Smithiana*), a splendid specimen of a beautiful tree.

Picea (?) *Albertiana*.

Retinospora obtusa (45 feet high, planted thirty years ago).

Sequoia sempervirens (about 90 feet high), a valuable timber tree.

Pinus patula (young trees).

P. Ayacahuite.

Cupressus macrocarpa.

It is evident that the Himalayan *Picea Smithiana* will succeed well in other than cold or Alpine climates. The cause of non-success with this tree in many places is probably traceable to injuriously high summer temperatures. I think this is one of the trees which should be tried in Ireland.

The specimen of *Ginko* at Carelew is the tallest I have seen, but the specimen at Chiswick House, Middlesex, is equally beautiful.

Retinospora obtusa, under favourable conditions, is evidently not the slow-growing tree it is in some localities.

Some of the Mexican *Coniferae* have done very well at Carelew, yet there are signs in many cases that their growing period has almost, if not quite, come to an end, and that the trees will never attain the stature they do in Mexico.

All the above ten species of conifers I noted in the beautifully wooded grounds of Carelew, where those which were mature had reached noble proportions. At Trewidden a great number of rare and beautiful conifers had been planted, and most of them looked the picture of health, but sufficient time had not elapsed for them to be classed as forest trees. In another twenty years it will be possible to form an opinion of their suitability for permanent planting in the Penzance district.

In Penzance gardens such genera as *Retinospora*, *Thuja*, and *Cupressus* (*Chamaecyparis*) flourish amazingly up to a certain size, and the golden garden varieties are specially noticeable for their beauty of colouring. *Cupressus macrocarpa aurea*, which I consider the best of all golden shrubs, was more beautiful in some of these gardens than in any other places where I have seen it growing. The type of *Cupressus macrocarpa* bids fairly well to become a tree, and should be largely planted. Cedars are absent from the gardens of Penzance.

RHODODENDRONS.

Although Rhododendrons revel in the climate of South-west Cornwall, it is not so with the deciduous section we used to class under *Azalea sinensis*. These evidently want a drier and cooler winter and a hotter

summer—a continental rather than an insular climate. They were just coming into bloom in the latter part of April. It is possible that the *A. rustica* section would stand the wet climate better, but I failed to note a single plant of this section whilst I was in Cornwall.

Evergreen Rhododendrons flourish wonderfully, and reproduce themselves freely from self-sown seedlings. Yet it seemed that they carry fruit more freely in the Fal valley than round Penzance. Colonel Tremayne assured me that the display of his Rhododendrons in the spring of 1905 was much below the average, which he attributed to the amount of fruit carried the previous autumn. At Trewidden I was told that no ill effects had ever been traced to over-fruiting. Yet it must be borne in mind that the latter is a comparatively new garden, whereas at Carelew the Rhododendrons have in many cases attained their maximum growth, and consequently to the period of maximum fruit-production.

At Trewidden one very beautiful natural hybrid was in flower, a spotless pink self, carrying an eight-flowered umbel of tubular flowers, each 4 inches span. The putative parents were *R. Thompsoni* and *R. Aucklandii*, and the hybrid was growing just where it had sprung up, close to the parent plants.

At Carelew I noticed some splendid forms of *R. campylocarpum* in which the flowers were of a fine yellow colour with a red base. Also some charming forms of garden origin, such as *R. (hort.) "Manglesii"* (blush to white, large flowers), and *R. indicum "Hexe"* (a dwarf floriferous variety, very decorative for pot work inside).

THE NEW ZEALAND CORDYLINES.

I noted four species :

(1) *Cordyline australis* : In almost every garden. At the period of flowering, which occurs at Penzance from May onwards, the plants break off into two or three leading growths, and this occurs when they have been planted out perhaps ten years. I have a pair in my garden at Isleworth which have been planted out for ten years, and have grown to a height of nearly 15 feet without flowering. Yet I am sure that this plant will not endure a really hard winter without protection, for I had a specimen equally tall in my York garden, which endured 20° of frost, but was cut down to the ground by 25° of frost. Nevertheless this same plant, having been thrown upon the rubbish-heap as dead, sprang up again, and I believe these are the identical plants which have now grown to fine specimens at Isleworth. However, it is only occasionally such severe frosts occur in the South of England, and the plant will withstand them if all the leaves are tied together upwards to a stick and covered by an Archangel mat (in the form of a cap), with another round the stem. But this covering must only remain on whilst unbroken frost continues.

(2) *Cordyline indivisa (vera)* : A splendid specimen grows at Trewidden. Although planted out only three years ago (when 1 foot high), it is already 7 feet high, with leaves 4 inches wide, markedly glaucous beneath, and ornamented with a bright orange midrib on the upper side. Undoubtedly the finest of all the hardy (or semi-hardy) cordylines, this

plant is difficult to grow in pots. It is a native of the higher mountains of New Zealand (where very severe frosts occur) and inhabits a zone of greater altitude than does the nearly hardy *C. australis*. Hence we may expect it to be quite hardy. Yet possibly our midsummer heat may be too great. As I saw it at Trewidden it was a splendid plant and looked the picture of health.

(3) *Cordyline indivisa* (of gardens): This is also grown at Trewidden, and is quite distinct from *C. australis*, and from the real *indivisa*.

(4) *Cordyline Banksii*, as grown at Trewidden, is not such a shapely plant as any of the foregoing, but carries wider and relatively larger racemes of flowers, and pushes these boldly out above the foliage.

The species of *Cordyline* flower freely at Penzance, and all bifurcate afterwards, in the same way as does *C. australis*. The flowering stage does not interfere with the after-life of the individual. I did not notice any attempt to grow such kinds as *Doucetii*, or any of the red-veined forms of *C. australis*, in the open ground. Great success might attend such experiments.

VARIOUS PLANTS.

Golden Euonymus (both *aurea* and *picta*). Common in gardens quite close to the sea, where drenched with salt spray.

Richardia africana. Common in gardens, flowering in April. Hardy.

Phormium tenax: Common in gardens. *P. t. variegatum* less common. Both flower with fair regularity.

Amaryllis belladonna is common in all Cornish gardens, and flowers yearly in all sorts of situations. *A. kewensis* I noted at Carelew and also the *blanda* of Continental nurseries, which is quite distinct from the true *blanda* of Herbert (now probably extinct).

Crocasmias of several kinds are naturalised at Trewidden.

Freesia refracta: This type is hardy in Penzance gardens.

Narcissus biflorus: Wild in some places, and on St. Michael's Mount, flowering in March, or a month earlier than round London. It is to be found in most gardens.

Sparaxis: Yellow and white forms were in flower at Carelew during my visit. No protection whatever is given to them.

Tulipa sylvestris: Rare in gardens, and not naturalised anywhere.

Iris tingitana: In flower at Trewidden, the plants being the finest I have ever seen, and the variety a good one, the blue and yellow being clearly defined, and more brilliant than is often the case.

Fatsia japonica: I found this in fruit in the Morrab Gardens, Penzance.

Myosotidium nobile: However difficult this plant may be to grow in some gardens, it flourishes at Carelew, and I saw it there in flower in April, looking quite at home.

Anemones of various kinds, including *A. fulgens*, are common in gardens, but do not flourish specially well, nor did I see any naturalised.

Roses generally did not seem to enjoy so much rain as the extreme S.W. coast of Cornwall provides.

Primulas.—I was disappointed with these plants, being there at a time when this genus is perhaps at its best. In the gardens I visited no special attempt is made to grow them well, nor do the British kinds flourish so well as in many parts of Britain.

Japanese Maples.—These are not as yet grown in many gardens. *A. palmatum* var. *rubrum* and var. *dissectum rubrum* seem the commonest. Even at Trewidden, where there are splendid specimens of these plants, no attempt has been made to mass them for colour effect. Yet the luxuriant health and brilliant colouring of the few plants I saw foreshadow a great future for these maples in Cornish gardens.

Tropæolum majus "Boule de feu."—At Trewidden a fine form is grown under this name. It is a climbing plant with medium-sized flowers of an intense orange red, freely borne, and standing out well from the small, very dark, villous leaves, which are of a peculiar sage-green and purplish hue.

GREENHOUSE PLANTS.

Dimorpheca Ecklonis.—In flower at Trewidden in April.

Decorative pelargonium "Purity." Very beautiful as grown at Carelew.

WILD PLANTS.

Scilla verna (?).—A minute erect scilla, common at Land's End, growing amid the Thrift on the cliffs. Although the bulbs are often buried several inches, the flowers are barely raised above the ground level, and are of a purplish-blue colour, borne on few-flowered scapes towards the latter part of April onwards.

Armeria vulgaris (Thrift).—Very common. Judging from the leaves, there would seem to be more than one form.

Arum italicum.—Not uncommon in hedgerows. I found it on St. Michael's Mount, and what was probably a variety of the same species in the woodlands round Carelew.

Cotyledon umbilicus.—Very common on walls by roadsides. The greenish-yellow flowers are regularly disposed on a relatively tall scape, and are open in May onwards. I have flowered it at Isleworth. It bears various local names, such as "Pancakes," "Wall-Pennywort," &c.

Cochlearia officinalis.—On the Logan Rock, bearing its dwarf white flowers throughout the early summer. Fairly common in a few localities.

Cochlearia sp.—On Logan Rock. This is a very dwarf and compact-flowered form, and is of considerable horticultural merit as a rock plant. It is not specifically distinct from *C. officinalis*.

Caltha palustris nana plena.—A very good form of this plant, in which the reproductive organs are completely suppressed, and which is very floriferous and only two to three inches in height, I noted in the garden of Mr. Casley at Penzance. He told me that a friend of his had gathered a root of this plant growing wild in a ditch a few miles from the town and brought it to his garden. Still it is probable that this is an instance of escape from cultivation, or of pollen having been carried by insect agency from a garden form to a wild one.

Narcissus biflorus.—Wild about Carclew and in some other places, but probably escaped from gardens.

Foxgloves.—These luxuriate in some places, notably at Lamorna, and flower fully a month earlier than about London.

Viola canina.—The finest and largest-flowered forms I have ever seen grow about Lamorna.

Rhinanthus Crista-galli (Yellow Rattle).—Common at Lamorna.

Plantago maritima.—I gathered several leaf varieties at the Logan Rock and at Land's End, growing indiscriminately in the earth or on the bare rock, and washed by salt spray daily.

Festuca ovina.—In varietal if not in typical form, this grass is found only just above the tide limit.

FERNS.

Tree-ferns (mostly *Dicksonia antarctica*) flourish, and most gardens of any pretension reserve a sheltered nook for their cultivation. The finest specimens I saw were undoubtedly those grown by Mr. Bolitho at Tre-widden, where sunken dells had been prepared for them, from the banks surrounding which the spectator could look down upon the ferns, and from such vantage-points see the full beauty of them.

The wild ferns were almost equally interesting and beautiful, the walls, rocks, and stone-revetted banks of the hedges were covered with an exuberant growth of ferns of many kinds, strongly reminding me of the ferneries of the Portuguese coast. Especially on the Logan Rock, I saw splendid forms of *Asplenium marinum*, but you have to climb for them if you want them, for all those easily reached are gathered as fast as they grow. I also gathered rare forms of *Asplenium nigrum* on the Logan Rock.

AN ANNOTATED LIST OF THE SPECIES OF *CAMPANULA*.

By Col. R. H. BEDDOME, F.L.S.

THE genus *Campanula* is a very fascinating one : many of the species are very beautiful, nearly all are hardy, and most of them easily grown. Every gardener gives more or less attention to them, and I am sure many must have felt the want of a good catalogue of the species and their synonymy. The genus has never been taken up specially since the publication of De Candolle's monograph in 1830 : this is now quite out of date. Nurserymen's catalogues, owing to the existence of numerous synonyms, are often very puzzling, so that amateurs wishing to form a good collection are often frustrated, and buy the same plant again and again under different names. Having made this genus a speciality in my garden for some years, and having lately studied it botanically in the herbarium and the library at Kew, and at the Natural History Museum, I have endeavoured to draw up an alphabetical list of all the species I have come across, either growing or dried, together with their synonyms. It is not of course anything like a complete list of all the species, as I have not included any species that I have not seen and studied myself ; but it probably includes all the species that have ever been introduced into cultivation, besides some that have not yet found their way into this country in a living state. I trust this list may prove useful to amateurs and others, and I hope also that it may lead to the introduction or reintroduction of some of the desirable species not now apparently in cultivation. Of these I may specially mention the following :—

pilosa, ***lasiocarpa***, and ***uniflora*** from North America, ***scutellata*** from Thessaly, ***Aucheri***, ***ardonensis***, and ***hypopolia*** from the Caucasus, ***stricta*** and ***macrochlamys*** from Erzerum.

I may call attention to the following as valuable new species or quite recent introductions, as yet only to be seen in a few gardens, but certain to be shortly in distribution :—

<i>imeritina</i>	.	.	.	.	Caucasus.
<i>incurva</i> (<i>Leutweinii</i>)	.	.	.	.	Thessaly.
<i>kolenatiana</i>	}	.	.	.	Caucasus.
<i>longestyla</i>					
<i>phytidocalyx</i>	.	.	.	.	Armenia.
<i>Raddeana</i>	.	.	.	.	Caucasus.
<i>rupestris</i>	.	.	.	.	Greece.
<i>Steveni</i>	.	.	.	.	Caucasus.

The genus does not lend itself kindly to hybridisation ; some of the species, however, sport very much from seed, as anyone can prove by sowing ***rotundifolia***, ***linifolia***, ***caespitosa***, and the different varieties of ***carpatica*** &c. Many of the supposed hybrids are probably sports, but there are undoubtedly some hybrids—I may mention one, of which there can be no doubt, and which can be seen in the herbarium at Kew. It

is a cross between **spicata** and **thyrsoidea** (raised in the Kew Gardens), with characters exactly intermediate between the two parents.

The headquarters of the genus is Eastern Europe, the mountains of Greece and Turkey, and farther east. The mountains of the Caucasus abound with fine species, a good many beautiful ones have lately come to us from this region; others have been described which have not as yet been introduced. If any of our great nurseries would make a speciality of the genus I am sure they would find it profitable. The botanical gardens at Tiflis might render valuable assistance in the introduction of novelties.

It cannot be expected that a long list like this can be without errors: I only hope they may be few. I issue it for what it is worth, hoping that it may lead up to a more perfect treatise as the newer species are grown on and better understood.

abietina.—Griseb. et Sch., in "Weigm. Arch." xv., i., p. 323 (1852) (fig. "Le Jardin," 1891, 115; "Reichb." xix. t. 1614).

(Syn. *patula* v. *pauciflora*, Koch, pl. Banat rar., f. 42, t. 6.)

Hab.: Austria-Hungary, the Balkans, Bulgaria, &c.

A pretty species, not a good doer, as it often dies after flowering; it requires frequent division.

acuminata.—Mich., "Fl. Bor. Amer." i. 108 = **americana**.

Adami.—Willd., ex "Steud. Nom.," 2nd ed., i. 265 = **lasiocarpa**.

Adami.—Bieb., "Fl. Taur. Cauc." i. 153 = **bellidifolia**.

aggregata.—Willd., "En Hort. Ber." Supp. 10. See **glomerata**.

Aizoon.—Boiss. et Spr., "Diagn. Pl. Or." iv. 34.

Hab.: Mountains in Greece, 5,000 to 7,000 feet.

A curious species; tufts of radical leaves; tall flower stems.

alaskana.—A species under this name has been sent out by Max Leichtlin. I cannot find it anywhere described, nor have I seen the plant in cultivation.

alata.—Desf., "Fl. Atl." i. 178, t. 80.

Hab.: Algiers.

A fine large species in the way of **peregrina**.

alliariaefolia.—Willd., "Sp. Pl." i. 910 (fig. "Bot. Mag." 23-912).

(Syn. *lamiifolia*. Bieb. "Fl. Taur." i. 154.)

Var. *fl. pl.*

Hab.: Caucasus, Armenia, &c.

A large, handsome, but rather coarse species; it seeds itself most freely, and often becomes rather a nuisance.

Allioni.—Vill., "Fl. Delph." 18, Prosp. 22 (fig. "Bot. Mag." 6588; "Journ. Roy. Hort. Soc." xxvi. 108, ex "The Garden").

Hab.: Mt. Cenis, Alps; Mt. Genève, Cottian Alps; summits of Mt. Bertrand, 9,000 feet; Maritime Alps; Taurus Mountains.

A very beautiful species for rockeries; requires a well-drained pocket, full of coarse grit and sand, plenty of room for its underground spreading roots, and constant watering. There is a white-flowering variety, a variable species, the leaves sometimes linear, sometimes broad, spatulate. Florists of course make varieties, but in a series it is seen that they run one into the other.

alpina.—Jacquin, "En Sit. Vind." pp. 36 and 210 (1767) (fig. "Bot. Mag." 957; "Journ. Roy. Hort. Soc." xxvii. 109, ex "The Garden").

Hab.: Tyrol, Austria-Hungary, &c.

A beautiful species for rockeries or pots; leaves narrow, ligulate; flowers very large. It requires a well-drained pocket in the rockery, soil equal parts of loam, leaf mould, and sand, and some lime rubbish broken small.

altaica.—L., DC., "Mon. Camp." 229, t. 10 = **pilosa**.

altaica.—Led., "Ind. Sem. Hort.," Dorpat 2 (1824) = **Steveni**.

althoa.—Boiss., B. and H., "Diag. Pl. Or." ser. iii. p. 110.

Hab.: Thessaly.

A border plant in the way of **C. Trachelium**, but flowers smaller in clusters up the stem.

amabilis.—Leichtl. in "Bull. Soc. Tosc. Ort." 1904, 339 = **phycido-calyx**.

americana.—L., "Sp. Pl." 164.

(Syn. *acuminata* Mich., "Fl. Bor. Am." i. 108.)

Hab.: Kentucky.

For borders—a large, rather coarse species; leaves ovate, serrate; racemes terminal, flowers nearly sessile.

anchusiflora.—Sibth., "Fl. Gr." t. 212E.

Hab.: Greece, Attica, Ins. Hydra.

For borders or rockeries—allied to **tomentosa**.

arcuata.—Sch. in "Varh. Sieb. Ver. Nat." x. (1859), 138 = **rotundifolia**.

ardonensis.—Rupr. in "Bull. Acad. Pétersb." xi. (1867), 212.

Hab.: Caucasus.

A fine species in the way of **linifolia**, but with very filiform leaves.

attica.—Boiss. et Hild. "Diag." ser. 1, xi. 67 = **drabaefolia**.

Aucheri.—DC., "Prod." vii. 460.

(Syn. *pubiflora* Rupr. in "Bull. Acad. Pétersb." xi. 207.)

Hab.: Caucasus.

A very fine species for rockeries; a small plant, leaves spatulate, chiefly radical; flowers solitary, large, on long, leafy stalks—near **saxifraga**.

Autraniana.—N. Alboff in "Bull. Hort. Boiss." ii. (1894), 115; iii. (1895), 519.

Hab.: Transcaucasus.

A fine large species; leaves unequally ovate, serrate; flowers large.

axillaris.—Boiss., "Diag." ser. ii., iii. 109.

Hab.: Taurus Mountains.

A large species; leaves ovate, serrate; flowers axillary, nearly sessile.

azurea.—Soland and Banks ex series "Bot. Mag." t. 551 = **rhomboidalis**.

The eleven species which follow are only of botanical interest:—

acutangula.—Ler. et Lev. in "Jour. Bot." xvii. (1879), 198. Spain (annual).

adsurgens.—Ler. et Lev. in "Jour. Bot." xvii. (1879), 199. Spain (annual).

Alphonsi.—"Wall. Cat." 1296. Nilgiris, 7,000 feet. India.

alsinoides.—Hook. and Thom., "Jour. Linn. Soc." ii. 24. N. India, 8,000–10,000 feet.

aparinoides.—Pursh., "Fl. Am. Sept." 1, 159. Hudson's Bay.

argaea.—Boiss., "Diag." ser. ii., vi. 119. Cappadocia.

argyrostricha.—"Wall. Cat." 7138. N. India, 8,000–11,000 feet.

aristata.—"Wall. Cat." 1291. Thibet, 11,000–16,000 feet.

asperrima.—Zucc. in "Rœm. Collect." 128.

atlantica.—Coss ex Batt., "Fl. de l'Algérie" (1888), 573. N. Africa.

aurita.—Greene, "Pittonia," i. (1888), 221. Washington.

Balchiniana.—Hort. See **isophylla**.

Balfouri = **G. F. Wilson**.—See under **pulla**.

barbata.—L., "Sys. Nat." 10th ed., p. 926 (1759) (fig. "Bot. Mag." 1258, "Fl. Dan. Suppt." i. 29).

Var. *alba*.

Hab.: Alps, Tyrol, &c., 2,000–7,000 feet.

Most desirable for rockeries; easily raised from seed; having a long tap-root it requires a deep porous soil.

Barrelieri.—Prest., "Symb. Bot." xxx. t. 19 = **fragilis**.

Baumgartenii.—Beck., "Fl. Francof." 1264. See **rotundifolia**.

Beauverdiana.—Formine in "Monit. Jard. Bot. Tiflis," i. p. 12, with fig.

Hab.: Armenia, Caucasus.

This has been sent out by MacLeichtlin and is in cultivation at Kew. I have only seen the figure, which shows great affinity with **bellidifolia** (Adams) and **Steveni**. Lower leaves ovate-crenulate, upper ones linear-lanceolate, denticulate; flowers 1–3, on an erect, slender flowering stalk, about 1 inch across.

bellidifolia.—Adams in "Webb & Mohr. Beitr." i. (1805), 47.

(Syn. *Adami* Bieb., "Fl. Taur. Cauc." i. 153.)

Hab.: Caucasus.

A good perennial, which has not, I believe, been in cultivation in England. The only specimen I have seen is in the herbarium of the Natural History Museum at South Kensington: it is in the way of **Steveni**, but more showy, a large tap-root, radical leaves, small, oval, subspathulate, crenulate; petioles very long; flowers large, terminal; calyx segments broad, lanceolate. This daisy-leaved Campanula might be procured from the Tiflis Botanic Garden; it would be a great addition to our rockeries.

bellidifolia.—Friv. ex "Nym. Consp." 476 = **orphanidea**.

bellidifolia.—Lepeyr. "His. Abr. Pl. Pyr." supp. 36 = **patula**.

betonicaefolia.—Sibth. et Sm., "Fl. Græc.," "Prod." v. 141 (fig. 210).

Hab.: Greece—Mount Olympus.

For borders, not a showy plant; leaves ovate, downy; flowers small, on axillary leafy racemes.

betulaefolia.—C. Koch in "Linnæa," xxiii. (1850), 635 = **denticulata**.

biebersteiniana.—Rœm. & Sch., "Syst." v. 147 = **tridentata**.

Billardieri.—DC., "Mon. Camp." 303, t. 13.

Hab.: Mount Olympus, Turkey; Taurus Mountains.

A graceful species; leaves rotundate, cordate, serrate; flowers rather small.

bithynica.—DC., "Prod." vii. 460 = **oreadum**.

bononiensis.—L., "Sp. Pl." 1st ed., p. 165 (1753) (fig. "Rehb. Ic. Crit." ii. t. 111).

Var. *obliquifolia*.

Var. *ruthenica*, M. & B., "Bot. Mag." 53, 2653.

Hab.: Switzerland, Germany, Austria.

For borders; a desirable species, 2 to 3 feet high; flowers purplish or white.

Burghalti.—Hort. See under **punctata**.

caespitosa.—Scop., "Flor. Carn." 2nd ed., p. 143, t. 4 (1772) (fig. "The Garden," June 14, 1893, and "Journ. Roy. Hort. Soc." vol. xxvii. p. 120; "Fl. Carn." i. t. 4).

(Syn. *pubescens*, Schmidt, "Rehb. Fl. Germ." 2013.)

pusilla, Haenke in "Jac. Coll." ii. p. 79 (1788).

pumila, Sims, "Bot. Mag." May 15, 512.

modesta, Schott, Nym. & Kots., "Anal. Bot." 83.

subramulosa, Jord. in "G. G." ii. p. 418.

gracilis, Jord., "Pugil. Pl. Nov." (1852), 122.

tyrolensis, Schott, Nym. & Kots., "Analect. Bot." 12.

Var. *alba*, white.

Var. *pallida*, very pale blue.

Hab.: The Alps, Tyrol, &c.

Most useful for rockeries or pot culture: generally sent out under the name of *pumila* or *pusilla*; the type has blue flowers.

Haylodgeensis.—"Gard. Chron." 1885, ii. 147.

A pretty plant of garden origin, probably hybrid off **caespitosa**.

calaminthifolia.—Gris, "Spic. Fl." i. 286 = **orphanidea**.

calycina.—Rœm. & Sch., "Syst." v. 104 = **Rapunculus**.

canescens.—Bieb., "Casp." 140 = **sibirica**.

capitata.—Sims, "Bot. Mag." 811 = **lingulata**.

carnica.—Schiede in "Mart. et Koch. Dreutsch." iii. p. 158.

Hab.: Tyrol, Transylvania.

Var. *tomentosa*.

A choice little species for pots or rockeries.

carpatica.—Jacquin, "Hort. Vind." i. p. 22 (1770) (fig. "Bot. Mag." 117; Nicholson's "Dict. Gard." i. 253).

Hab.: Carpathian Mountains &c.

Var. *alba*.—The white variety.

Var. *caelestina*, "Gartenwelt," vii. 570.—Very fine sky-blue flowers.

Var. *Fergusoni* ("Journ. Roy. Hort. Soc." xxix. part 4, p. cxcvi. (1904); "Gard. Mag." (1904), 794; "Gard. Chron." (1904), xxxvi. 191).—A sport or hybrid with *pyramidalis* flowering profusely all

September and October; flowers larger and finer than the type. One of our best border Campanulas and a good pot plant, a very free grower. Hardly differs from White Star except in the colour of the flowers.

Var. *Hendersonii* ("Gard. Chron." 1882, ii. 502).—A sport or hybrid. Inferior to the last, not such a good grower and apt to die after flowering. *Tymonsii* is a synonym.

Var. *Isabel* ("Journ. Roy. Hort. Soc." xxix. part 4, p. xciii. [1904]).—A good dwarf floriferous variety; flowers blue, flat.

Var. *Little Gem*.—A pretty dwarf form.

Var. *pelviformis* ("Rev. Hort." 1882, 509).—A valuable hybrid form, a first-class rockery plant.

Var. *Riverslea* ("Journ. Roy. Hort. Soc." xxv. [1900]).—Sport or hybrid; flowers larger than the type and flat; a good dwarf border plant.

Var. *turbinata* ("Gartenfl." t. 831).—Sport or hybrid, a first-class rockery plant. There are several forms of it, as it sports much from seed.

Var. *White Star* ("Journ. Roy. Hort. Soc." xxxi. cxi. 1906).—A splendid sport, most free-flowering; one of the finest Campanulas for borders or pots.

caucasica.—Bieb., "Casp." 140, app. n. 14 = *sibirica*.

Cavolini.—Ten., "Fl. Nap." t. 213 = *fragilis*.

Celsii.—DC., "Mon. Camp." 217 = *tomentosa*.

celtidifolia.—Boiss., "Diag." ser. ii., iii. 111 = *lactiflora*.

cenisia.—L., "Sp. Pl." 2nd ed., pp. 1669 (1763); fig. "Froehl. Arpenpt.," i. 5; "Journ. Roy. Hort. Soc." vol. xxvii. p. 110; All. "Pl. Pedem." iii. t. 6.

(Syn. *Kitaibeliana*, Rœm. et Sch., "Syst." v. 90.)

Hab.: Alps, Mount Cenis, Carnic Alps, Styria.

A small choice rockery plant, but difficult to grow. It requires a well-drained pocket in the rockery, filled with very gritty soil and sand. Specimens of this and the other small rockery gems should also be in pots, as slugs and damp are so destructive to them in the rockery that they often disappear unless constantly watched. It is a good plan to put a layer of small stones over the soil round the plant, and in winter fill in the interspaces with soot.

Cervicaria.—L., "Codex," 1313 (fig. "Fl. Dan. Ic." v. t. 787); "Rehb. Ic. Crit." vi. 572.

Hab.: Greece.

A rather ugly species with axillary and capitate flowers; leaves long, linear, scarcely worth growing; biennial.

cichoracea.—Sibth. & Sm., "Fl. Græc." t. 209 = *lingulata*.

ciliata.—Stev., in "Mém. Soc. Nat. Mosc." iii. (1812) = *tridentata*.

collina.—M. Bieb., "Fl. Taur. Cauc." i. 152 (fig. "Rehb. Ic. Crit." x. 957).

Hab.: Caucasus, Armenia.

A choice species for borders or rockery; flowers large, deep blue, easily grown from seed or division.

colorata.—Wall, Cat. 1287 (fig. "Bot. Mag." 4555).

Hab.: Himalayas, 3,000 feet and upwards.

Not quite hardy, but a nice pot-plant. Two varieties are recorded—
var. *tibetica* and var. *anomala*.

coriacea.—Boiss. et Kotsh. ex "Fl. Or." iii. 910=**radula**.

corymbosa.—Desf. in "Ann. Mus. Par." xi. (1808), 139 (fig. "Desf. Choix," 30).

(Syn. *pelviformis* Lam. "Enc." i. 586; *tubulosa* Lam. "Enc." i. 588.)

Hab.: Crete, Candia.

A border plant, allied to medium.

crassipes.—Heuff. in "Oest. Bot. Zeit." viii. 1858, p. 27=**macrorrhiza**.

cristalocalyx.—Adamov in "Denk. Akad. Wien. Mat. Nat." lxxiv. 141
=**persicifolia**.

Cymbalaria.—Sibth. & Sm., "Fl. Græc.," "Prod." i. 139=**Billardieri**.

The nine species which follow are only of interest to botanists:—

calamenthifolia.—Lam. "Dic." i. p. 585 (fig. DC., "Mon. Camp." Pl. 9.

Greek Islands, Naxos, Delos, &c.).

camptoclada.—Boiss., "Diag." ser. i., xi. 63. Syria.

cana.—Wall, Cat. 1284. Western Himalaya.

candida.—DC., "Mon. Camp." 234. Syria.

canescens.—Wall, Cat. 1289. Afghanistan.

cashmeriana.—Royle, "Ill." i. 254, t. 62. West Thibet and Cashmir,
600–1,100 feet.

circaeoides.—F. Schm., "Reis. Amur," 154. Japan.

compacta.—B. and H., "Diag." ser. i., xi. 71. Armenia.

conferta.—DC., "Prod." vii. 468. Syria.

Daltoni.—Webb=**Jacobaea**.

denticulata.—Boiss., "Diag." ser. ii., iii. 107.

(Syn. *betulaefolia*, C. Koch in "Linnæa," xxiii. [1850], 635.)

Hab.: Armenia.

A very fine species; leaves ovate, denticulate; racemes axillary;
flowers large, pinkish; rare in cultivation.

dichotoma.—L., "Sp. Pl." p. 237 (fig. "Rehb. Pl. Crit." 441).

(Syn. *Kremeri* Boiss. et Reut., "Pugill. Pl. Nat." 75.)

Hab.: Spain, Sicily, Algiers, Socotra.

A rather pretty annual; grows readily from seed.

divergens.—Willd., "En Hort." i. 212. See **Sibirica**.

drabaefolia.—Sibth. and Sm. "Fl. Gr." t. 215.

(Syn. *attica* Boiss. et Held., "Diag." ser. i., xi. 67.)

Var. *alba*.

Hab.: Greece, island of Samos.

A pretty annual.

The four species which follow are only of botanical interest:—

decumbens.—DC., "Mon. Camp." 334, t. 11, f. Spain=**Loeflingii**?

delicatula.—Boiss., "Diag." ser. i., xi. 67. Egypt.

dimorphantha.—Schweinf., "Beit. Æthiop." 140. Egypt.

dulcis.—Decaisne in "Ann. Sc. Nat." ser. 11, ii., 1834, p. 258(=**damascena** Labill.). Lebanon.

Elatines.—L., "Sp. Pl." 240 (fig. All. "Fl. Piedm." No. 422, tab. 7; "Journ. Roy. Hort. Soc." vol. xxvii. p. 111; "Garden," July 27, 1901).

Hab.: Isle of Cherso, Northern Adriatic Sea.

A more delicate species than **elatinoides**; leaves long-petioled, very sharply denticulate. There are two varieties, one glabrous, the other downy; it requires perfect drainage and a gritty soil mixed with stones; grown easiest in pots.

elatinoides.—Moretti in "Brug. Giorn." (fig. iv. v. [1802], 110) (fig. "Reichb. Ic. Pl. Germ." xix. t. 1607).

Hab.: Italy.

Woolly cordate leaves; small flowers.

elegans.—Rosm. and Sch. "Syst." v. 105.

Hab.: Siberia.

Small species, about 1 foot; upper leaves linear, lanceolate, entire, sessile; lower ones petioled; flowers axillary, spicate.

ephesia.—Boiss., "Fl. Or." iii. 898 = **tomentosa**.

erinoides.—Cav. in "Anat. Cien. Nat." iii. 1880, 20 = **Loeflingii**.

Erinus.—L., "Sp. Pl." p. 240 (fig. Sibth. "Fl. Gr." t. 214).

Hab.: S. Europe, Sicily, Spain, Morocco, Teneriffe.

Rockery annual; flowers very small; scarcely worth growing.

eriocarpa.—Bieb. "Fl. Taur." i. 149. See **latifolia**.

esculenta.—A. Rich., "Tent. Fl. Abyss." ii. 4.

Hab.: Abyssinia.

A perennial with a thick tap-root; leaves oval to oblong, obtuse, subspathulate, hairy; flowers terminal, solitary, large; rare in cultivation.

excisa.—Schleich. ex "Muretti Guide Val." 33, 35 (fig. "Bot. Mag." 7358; "Journ. Roy. Hort. Soc." vol. xxvii. p. 112; "Garden," July 27, 1901).

Hab.: Switzerland, Alps of Saas, and Simplon region, 6,000-8,500 feet; Transylvania.

A lovely little pot-plant requiring a very gritty soil and perfect drainage; it must be constantly looked after if placed in the rockery.

expansa.—Friv. in "Flora," xix. (1836), ii. 434.

(Syn. *sphaerotherix*, Griseb., "Spicil. Fl. Rumel." ii. 280 [1841]; *Welandii*, Heuff. in "Oest. Bot. Woch." 1857).

Hab.: Transylvania, Mt. Rilo in Bulgaria, Servia, Greece.

A tall species in the way of **rapunculus**. Annual.

farinulenta.—Kerner and Watt, "Oest. Bot. Zeit." xxxvii. p. 80 (1887).

Hab.: Dalmatia.

Near *linifolia*, a small species with serrated leaves.

fenestrellata.—Feer. "Journ. of Bot." 1890, p. 272.

Hab.: Croatia.

A species nearly allied to **garganica**.

Fergusonii.—Hort. "Garden," October 22, 1904; "Gard. Mag." 1904, 794; "Gard. Chron." 1904, xxxvi. 191. See under **carpatica**.

ficaroides.—Timb. in "Mém. Acad. Toulouse," ser. v., vi. 1862, 33 = **linifolia**.

foliosa.—Ten. "Prod." xvi. et "Fl. Nap." i. p. 71, tab. xviii. (fig. "Rehb. Ic. Crit." vi. 560).

Hab.: S. Europe.

A species allied to **glomerata**.

fragilis.—Cyrill., "Rar. Nap." i. 32 (fig. "Bot. Mag." 6504).

(Syn. *Cavolini*, Ten., "Syll." p. 94; *Barrelieri*, Presl. "Symb. Bot." 30, t. 19.)

Var. *B. hirsuta*, a fine downy var. Sorrento.

Hab.: S. Italy, Naples, &c.

A charming species for hanging baskets or pots.

The four species which follow are only of botanical interest:—

fastigiata.—Dufour, DC., "Camp." 1830, p. 340, tab. 12, fig. B.

Hab.: Caucasus.

filicaulis.—D. K., "Dur. Expt. Alger." t. 62.

Hab.: Morocco.

floridana.—Watson ex A. Gray, "Syn. Fl. N. Amer." ii., i. 13 (= **calycina**, "Tour. et Gr.").

Hab.: Florida.

fulgens.—Wall, Cat. 1283.

Hab.: Himalayas, Nilgiris, Ceylon.

garganica.—"Ten. Cat. Sem. Hort. Nap." (1827), 3 (fig. "Bot. Reg." 1768).

Var. *hirsuta*.

Var. *hirsuta alba*.

Hab.: Cephalonia, Italy.

A very variable species, valuable for the rockery or pots. It flowers so profusely that death results if the plant is not attended to.

glomerata.—L., "Sp. Pl." 1st ed., p. 166 (1753); fig. "Eng. Bot." 3rd ed., tab. 866; Nichol, "Dict. Gard." i. p. 254.

(Syn. *stenosiphon*, Boiss. et H., "Diag." ser. vii., 18; *vlachova*, Boiss., "Fl. Or." iii. 927.)

Var. *alba*.

Var. *acaulis*, "Gartenwelt," viii. 570. Stemless, flowers very large.

Var. *aggregata*.

Var. *dahurica*.

Var. *pusilla*.

Var. *fl. pl.*

Hab.: England, Southern Europe, Nice, Hungary, Greece, Armenia, Manchuria.

An exceedingly variable species: *aggregata* and *dahurica* are good border plants.

gracilis.—Jord., Pugil., "Pl. Nov. Anal. Bot." 13 = **caespitosa**.

gracilis.—Bert. in "Coll. in Mem. Acc. Tor." xxxviii. (1835), 119 =

Wahlenbergia Barterisi.

gracilis.—Boiss., "Diag." ser. i., x. t. 77 = **Phyteuma lobelioides**.

gracilis.—Forst., "Prod." 15 = **Wahlenbergia gracilis**.

grandiflora.—Jacq., "Hort. Vindol." iii. 4 = **Platycodon grandiflorum**.

grandis.—Fisch. & Mey., "Ind. Sem. Hort. Petrop." v. 34 = **latiloba**.

Grossekii.—Heuffl. in "Fl." xvi. p. 353 (1833).

Hab.: Italy, S. Europe.

A large coarse species in the way of **alliariaeifolia**; flowers axillary, solitary, or in clusters; a border plant.

hagielia.—Boiss., "Fl. Or." iii. 889 = **lyrata**.

haylodgensis.—"Gard. Chron." 1885, ii. 147. See under **caespitosa**.

hederacea.—L., "Fl. Dan." ii. p. 330 = **Wahlenbergia hederacea**.

hemschinica.—Koch in "Linnæa," xxvii. (1850), 644.

Hab.: Mt. Vitosha and Mt. Rilo, Bulgaria; Asia Minor, N. Persia.

A fine species in the way of **Steveni**, but biennial.

Hendersoni.—Hort. See **carpatica**.

Herminei.—Link. & Hoffm. "Fl. Port." 79 (fig. "Boiss. Voy." t. 129, f. b).

Hab.: Portugal, Atlas Mts., Morocco.

A pretty species in the way of **rotundifolia**.

hispanica.—Willk. & L., "Prod. Fl. Hisp."

Hab.: N. Spain.

Near **rhomboidalis**, probably only a form of it.

Hostii.—Baumg., "En. St. Trans." iii. 342. See **rotundifolia**.

hypopolia.—Trantv. in "Act. Hort. Petrop." iv. p. 389.

Hab.: Caucasus.

A fine species in the way of **linifolia**, but leaves very narrow and thread-like; flowers large, numerous.

The four species which follow are only of botanical interest:—

halacyana.—Baldacci in "Malpighia," viii. 1894, 280. Albania, small annual.

Hawkinsiana.—Hausskn. & Heldr. Albania.

hierosolymitana.—Boiss., "Diagn." ser. i., xi. 62. Palestine, annual.

hyrcania.—Stapf in "Denk. Acad. Wien," i. (1885), 69. Persia.

imeritina.—Rupr. in "Bull. Acad. Pétersb." xi. (1867), 217.

Hab.: Caucasus.

A valuable species lately introduced; in the way of **divergens**.

incurva.—Auch., DC., "Prod." vii. 464.

(Syn. *Leutweinii*, Hedr., in "Ann. Sci. Nat." ser. iv., xii. [1860], 374.)

Hab.: Thessaly.

A pretty new introduction; leaves cordate, white, downy, crenate, much rounded at the apex; flowers large, it is being sent out from nurseries under the name of **Leutweinii**; it is allied to

lanata, but that species has its leaves more pointed at the apex. I have not succeeded yet in flowering either of these species, they are probably difficult near London.

infundibulum.—Vest. ex Rœm. & Sch., "Syst." v. 106 = **Steveni**.

intypus.—S. & K. ex "Tchih. As. Minor Bot." ii. 402 = **trichyphylla**.

involutrata.—Auch., DC., "Prod." vii. 467.

Hab.: Cappadocia.

A fine species; flowers large, capitate, surrounded by a large involucre.

Isabel.—"Journ. Roy. Hort. Soc." xxix., part 4, p. xciii. See **carpatica**.

isophylla.—Moretti in "Br. Giorn. Fis." ii., vii. 44 (1824) (fig. "Rechb. Ic. Crit." iii. 202).

Var. *alba*.

Hab.: Italy, Cape de Noli.

The best Campanula for hanging baskets or pots. It is not quite hardy and should be under glass during the winter.

Balchiniana, a beautiful hybrid variety and a profuse bloomer, most useful for hanging baskets. It is generally grown under the name of *Mayi*, but it is only *Balchiniana* without variegation. For a long time I only possessed the variegated form; this occasionally sent up extra strong shoots without any variegation, these being removed and rooted made much finer and stronger plants than the parent, with larger and more numerous flowers; it was only subsequently on purchasing the so-called *Mayi* that I found it was identical.

Balchiniana variegata, a very pretty foliage plant, but as to flowers much inferior to *Balchiniana*, a hybrid between *fragilis* and *isophylla alba*. It likes a gritty soil and must not be overwatered, and dislikes a hot sun. It was raised by W. Balchin in 1896.

The following species is only of botanical interest:—

incanescens.—Boiss., "Fl. Or." iii. p. 912. Caucasus, Persia, near Shiraz.

Jacobaea.—C. Sm., Hook. "Niger Fl." 148, t. 12 (fig. "Bot. Mag." 6703). (Syn. *Daltoni* Webb in "Herb. Kew.")

Hab.: Cape Verde.

A fine pot-plant, not quite hardy.

janisensis.—Sch. See **rapunculoides**.

Kernereri.—J. Wit., "Fl. exsic. Aust.-Hung." 3305.

Hab.: Tyrol.

Scarcely more than a variety of **Scheuchzeri**.

Kitaibeliana.—Rœm. and Sch., "Syst." v. 90 = **cenisia**.

kolenatiana.—C. A. Mey. ex Rupr. in "Bull. Acad. Pétersb." xi. 216 (1867).

Hab.: Caucasus.

A lately introduced species, perennial (?); leaves chiefly radical, ovate on a long-winged petiole, flowers on long-peduncled racemes, 1 inch long, pilose inside; bluish-violet.

Kremeri.—Boiss. et R. Pugile, "Pl. Nov.," 75=**dichotoma**.

The two species which follow are of botanical interest only:—

khasiana.—Hook. & Thoms., "Journ. Linn. Soc." ii. 25. Khasia Hills, 4,000–6,000 feet.

Kotschyana.—DC., "Prod." vii. 481. Taurus.

Lacei.—Duthie MS.

Hab.: Kumaon, 13,000 feet; Chamba State, 6,000 feet (India).

A pretty species; lower leaves lanceolate, serrate; upper ones linear; flowers large, several on terminal racemes. **Young-husbandi**, Prain, seems to be a pubescent form of this species.

iaciniata.—L. "Sp. Pl." 165 (fig. Nichols, "Enc. Hort." vol. i. p. 255? "Andr. Rep." vi. 385).

Hab.: Greece.

A very fine species, but I believe only biennial.

lactiflora.—M. Bieb., "Fl. Taur. Cauc." 153 (fig. "Bot. Mag." 1973). (Syn. *celtidifolia* Boiss., "Diagn." ser. ii., iii. 111.)

Hab.: Caucasus.

A fine border species. It is of slow growth, but eventually (in about three years from seed) becomes a fine large plant which flowers very freely. There are several forms, chiefly differing in the colour of the flowers, white and shades of pink.

Lambertiana.—DC., "Mon. Camp." 327. See **Rapunculus**.

lamiifolia.—Bieb., "Fl. Taur." i. 154= **alliariaeifolia**.

lanata.—Friv. in "Fl." xix. (1836), 434 (fig. "Acta Acad. Hung." [1837], i.; "Journ. Roy. Hort. Soc." xxvii. p. 113, ex "The Garden").

(Syn. *velutina* Velenosky, "Fl. Bulg." i. 365, not Desf.)

Hab.: Bulgaria, Eastern Rumelia, Mt. Rhodope in Turkey.

A fine species with whitish downy cordate leaves and large flowers; it is not an easy species to flower, at least near London.

lanceolata.—Lap., "Hist. Pl. Pyr." 105. See **rhomboidalis**.

lanceolata.—DC., "Mon. Camp." 321 = **Steveni**.

lanceifolia.—Schr., "En Pl. Trans." 445 = **rotundifolia**.

Lamysdorffiana.—Fisch. in DC., "Mon. Camp." 271 = **linifolia**.

lasiocarpa.—Cham "Linnæa," iv. (1829), 39.

(Syn. *algida* Fisch. in DC., "Mon. Camp." 338; *Adami*, Willd. exsic. "Steud. Nom." 2nd ed., i. 265.)

Hab.: Rocky Mountains, America.

A small very beautiful species, flowers very large.

latifolia.—L., "Sp. Pl." 1st ed., p. 165 (1753) (fig. "Eng. Bot." 3rd ed., t. 868).

Hab.: England and Europe generally; Cashmir.

A well-known tall species much in cultivation as a border plant. Var. *macrantha*; "Bot. Mag." 2553, very similar to the type, but flowers much larger.

Var. *eriocarpa*, DC., Bieb., "Fl. Taur." 147.

latiloba.—DC., "Prod." vii. 478 (fig. "Paxt. Mag." x. 31).

(Syn. *grandis* F. & M., "Ind. Sem. Hort. Petrop." v. 34.)

Hab.: Siberia.

Var. *alba*.

Var. *pallida*; "Gard. Chron." 1902, xxxii. 24; heliotrope-coloured flowers.

A most valuable showy border plant; grows well in rather shady places; spreads rapidly; easily divided. There are two forms of the type (blue flowers) differing in the size of the leaves and flowers.

Lehmanniana.—Bgr. in Lehm. "Reliq. Bot." 211 (fig. "Ann. Sc. Nat." xvii. (1884), t. 15a).

Hab.: Turkistan.

A desirable plant; height 8-10 inches; leaves small, lanceolate, serrate; flowers racemose, large.

Leutweinii.—Hedr. in "Ann. Sci. Nat." ser. iv., xii. (1860), 374 = **incurva**.

libanotica.—DC., "Prod." vii. 462. See **stricta**.

lingulata.—Waldst. et Kit. "Fl. Hung." t. 64 (1802) (fig. "Rchb. Ic. Crit." vi. 574).

(Syn. *capitata*, Sims "Bot. Mag." t. 811.)

Hab.: Bosnia, Servia, Thessaly, &c.

Leaves linear, spatulate, very scabrous; flowers chiefly capitate; in the way of *glomerata*.

linifolia.—"Scop. Ann. Hist. Nat." p. 47 (1769) (fig. Rchb. "Ic. Pl. Germ." xix. t. 1602; Timb. "Lag. Camp. Pyr." t. 1; Nich. "Enc. Hort." i. p. 255).

(Syn. *ficaroides*, Tim. in Mém. Acad. Toulouse," ser. v., vi. 1862, 33; *Langsdorffiana*, Fisch. ex DC., "Mon. Camp." 271.)

Var. *valdensis*, "Fl. Ped." iii. t. 6. A pubescent form.

Hab.: Alps, Tyrol, &c., N. America.

A most valuable plant for rockeries; a strong grower; it is scarcely more than a variety of **rotundifolia**, the rounded basal leaves being sometimes though not always present. The leaves are generally larger and the flowers finer, but there are intermediate forms. *Ficaroides* is a form with much smaller leaves than the type: it is well figured in "Étude sur quelques Campanules des Pyrénées," by Timbal Lagrave. These forms are not constant, so any attempt to make separate varieties for them must only lead to confusion: **linifolia** and **rotundifolia** sport very much from seed, and no variety can be depended on to come true. It is also to be noted that soil and situation are great factors in the case of certain varieties or forms.

Loeflingii.—Brot., "Fl. Lusit." i. p. 287 (1804); Brot., "Phytogr." 18.

(Syn. *longipes* Coss. ex "Nym. Comp." 482.)

(*erinoides* Cav. in "Anal. Cienc. Nat." iii. 20 [1800].)

(*matritensis* DC., "Mon. Camp." p. 332.)

(*Duriaei* Boiss., "Voy. Bot. Esp." 401.)

Hab.: Portugal, Spain, Morocco.

Annual.—A pretty species allied to **rhomboidalis**.

longestyla.—Thomina in "Acta Hort. Tiflis," vi. 37.

Hab.: Caucasus.

Quite a new introduction; a beautiful species with racemes of large deep-blue flowers. It seeds freely; sown in the autumn it flowers in the early summer and lasts a long time in great beauty; sown in the spring a small percentage will flower late in the summer. Grouped in a bed it is a fine sight.

Loreyi.—Pollini (1811), "Elem. Bot." ii. 149=**ramosissima**.

lyrata.—"Lam. Enc." i. 588.

(Syn. *hagielia*, Boiss., "Fl. Or." iii. 896.)

Hab.: S.E. Europe, Mount Olympus (Turkey), Asia Minor, Isle Kalymnus (Aegean Sea).

A fine, tall species; very variable in the shape and size of its lyrate leaves; allied to **tomentosa**.

The two species which follow are of botanical interest only:—

leucosiphon.—Boiss., "Diagn." ser. i., xi. 64. Syria.

lourica.—Boiss. "Diagn." ser. i., xi. 70. Syria, Persia.

macrantha.—Hort. See **latifolia**.

macrochlamys.—Boiss. et H., "Diagn." ser. ii., iii. 111.

Hab.: Erzeroom.

A very curious species; flowers capitate in a very large involucre.

macrophylla.—Sims, "Bot. Mag." t. 912 = **alliarieaefolia**.

macrorrhiza.—J. Gay in "Rechb. Fl. Germ." i. (1830), p. 298 (fig. "Moggr. Menton," 29).

(Syn. *tenella*, Jord. "Pugill. Pl. Nov." 1852, 125; *crassipes* Heuff. in "Oest. Bot. Zeit." viii. p. 27.)

Var. *sardoa*, Levier ex "Parl. Fl. Ital." viii. (1888), p. 101. Mt. Tivolari.

Hab.: France, common in Brittany.

Very near **rotundifolia**; the inflorescence is more branched and the flowers more numerous; rounded basal leaves are often present.

macrostachya.—Waldst. et Kit. apud Willd., "En Pl. Hort. Berol." p. 213 (1809).

(Syn. *multiflora*, Waldst. et Kit. "Pl. Rar. Hung." iii. 292.)

Hab.: Hungary, Mt. Vitosha, Bulgaria, Philippopolis, East Rumelia.

Leaves narrow, lanceolate; flowers small on a long spike, scarcely of more than botanical interest.

macrostyla.—Boiss. et H., "Diagn." ser. v., xi. 65 (fig. "Bot. Mag." t. 6394; "Gartenfl." t. 1395).

Hab.: South Asia Minor.

Annual. A very curious but beautiful species; flowers very large with a prominent style and stigma. There are blue and pink varieties.

matritensis.—DC., "Món. Camp." p. 332 = **Loeflingii**.

Mayi.—"Garden," 1899, lvi. 89, 92. See *Balchiniana* under **isophylla**.

Medium.—L., "Sp. Pl." 167 (fig. Nichols, "Dic. Gard." i. p. 256).

Var. *fl. pl.*

Var. *calycanthemum*. Calyx-flowered variety.

Var. *Wiegandi* "Wien. Ill. Gart.-Zeit." 1903, 416. Golden foliage.

Hab.: South Europe.

The Canterbury bell; biennial, but should find a place in every garden; the flowers are white or various shades of blue and pink; the calyx or saucer-flowered varieties are very effective either in pots or in the border.

michauxioides.—Boiss., "Diagn." ser. i., iv. 36.

Hab.: Asia Minor.

An interesting plant, but the flowers are very small.

mirabilis.—Alboff in "Bull. Herb. Boiss." (1895), 228 (fig. "Gard. Chron." 1898, ii. p. 33, f. 10).

(Syn. *regina*, Alboff in "Nature," liv. 1896, 46.)

Hab.: Caucasus.

A most beautiful plant when well grown and in full flower. It requires a thoroughly drained pocket in the rockery and a rough gravelly soil with plenty of stones mixed with it; it grows away freely in this and flowers well. It is only biennial but seeds freely; the seed germinates well in ordinary soil, but the young plants must soon be transplanted into grit. Whenever I have planted it in rich or even ordinary soil it has been more or less a failure

modesta.—Schott., Nym., and Kots., "Anal. Bot." 13 = **caespitosa**.

mollis.—L. "Sp. Pl." 2nd ed., p. 237 (fig. "Bot. Mag." 12, 404).

(Syn. *velutina*, Desf., "Fl. Atl." i. 180, 51.)

numidica Dur., "Exp. Algér." t. 62.

microphylla, Cav. in "Anal. Cienc." iii. (1800), 19.

Hab.: Spain, Gibraltar, &c.

Very small, oval, downy white leaves; the lower ones generally spatulate; flowers $\frac{1}{2}$ – $\frac{3}{4}$ in. long.

moorheimi.—"Jour. Roy. Hort. Soc." xxv. p. xci. See **persicaefolia**.

Morettiana.—Reichb. "Ic. Bot. Cent." p. 18, t. 320 (1826) (fig. Newt. "Gar. Mag." 1853).

Hab.: Tyrol, &c.

A charming little species; leaves small, serrate, hairy; flowers large, blue.

multiflora.—Waldst. et Kit. "Pl. Rar. Hung." iii. 292 = **macrostachya**.

muralis.—Portens., 1830; DC., "Mon. Camp." 303 = **Portenschlagiana**.

The following species is only of botanical interest:—

modesta.—Hook. and Thom., "Jour. Linn. Soc." ii. 24. Sikkim, 12,000–14,000 feet.

nitida.—Ait., "Hort. Kew," i. 346 = **planiflora**.

nobilis.—Alboff, "Ldl. Journ. Hort. Soc." i. (1846), 232 = **punctata**.

numidica.—Dur., "Exp. Algér." 62 = **mollis**.

The following species is only of botanical interest:—

naesica.—Velen, "Nachtr. F" Bulg." (1892), p. 17.

Hab.: Bosnia.

An ugly species in the way of **thyrsoides**.

odontosepala.—Boiss., "Diagn." ser. i., xi. 66.

Hab.: Caspian region, Persia.

In the way of **americana**; flowers large.

Olivieri.—DC., "Mon. Camp." p. 233, t. 9=**calamenthifolia** Lam.

olympica.—Boiss., "Diagn." ser. i., iv. 34.

Hab.: Mt. Olympus—Asia Minor.

A pretty species in the way of **abietina**, biennial.

orbelica.—"Panc. Elem." 48.

Hab.: Bulgaria.

A small desirable species in the way of **linifolia**; leaves chiefly radical; flowers large.

oreadum.—Boiss. et Held., "Fl. Or." iii. 905.

(Syn. *bithynica* DC., "Prod." vii. 460.)

Hab.: Mt. Olympus—Greece.

A small desirable species; leaves small spatulate; flowers large, near *Saxifraga*, perhaps a synonym.

Orphanidea.—Boiss., "Fl. Or." iii. 897.

(Syn. *calaminthifolia*. Gris. "Spic. Fl. Rumel." i. 286.)

Hab.: Macedonia, Turkey; Mt. Athos, Is. Naxos.

Very near **saxatilis**, a smaller and prettier species than **tomentosa**; flowers larger; leaves white downy, cordate, ovate on long flattened petioles.

Pallasiana.—R. and Sch., "Syst." v. 138=**pilosa**.

Parryi.—Gray in "Syst. Fl. N. America," ii. tab. 355.

Hab.: Georgetown, America.

A small species in the way of **Steveni**, but much finer; leaves linear; flowers large, terminal.

patula.—L., "Sp. Pl." 1st ed., p. 163 (1753) (fig. "Eng. Bot." 3rd ed., t. 873).

Hab.: England, Worcester, Hants, &c.; Tyrolese Alps.

Biennial; a very variable species, allied to **Rapunculus**.

pelia.—Haussk. MS. Herb. Kew.

Hab.: Thessaly.

One of the lyrate-leaved section; very close to **rupestris**; however, in this the calycine lobes are prominently toothed.

pelviformis.—Lam., "Enc." i. 586=**corymbosa**.

pelviformis.—Hort. (see **carpatica**).

peregrina.—L., "Mant." ii. 204 (fig. "Bot. Mag." 31, 1257).

(Syn. *primulaefolia*, Brot., "Fl. Lusit." i. p. 288 [1804]; Brotero, "Phytogr." 19–20 [1816].)

Hab.: Portugal, Tripoli, Palestine, Beyruth, Lebanon, &c.

Biennial, but a handsome species, well worth growing, grouped together in borders or singly in pots; it seeds freely. *Primulaefolia* has been considered a good species, and stated by De Candolle to be a perennial, which is not the case. I have grown a great many from seed from both the western and eastern localities, and examined specimens in the Kew Herbarium, and have no doubt about their being identical. It is a most uniform species, and not variable like many of the species of this genus.

persicifolia.—L., "Sp. Pl." 1st ed., p. 164 (1753) (fig. Sibth. and Sm., "Fl. Gr." t. 205).

(Syn. *cristalocalyx*, Adamov in "Denk. Akad. Wien. Mat. Nat." lxxiv. 141.)

Hab.: Portugal, Sicily, Austria, Turkey.

Var. *alba*.

Var. *alba fl. pl.*

Var. *alba coronata*.

Var. *Moorheimi*, "Gard. Chron." xxvii. (1900), 409; "Journ. Roy. Hort. Soc." xxv. p. xci. Semi-double pure white flowers on erect slender stems.

There are several double and semi-double varieties under fancy names.

One of the most valuable of the genus for borders, and grown in almost every garden; it sports very much from seed.

petraea.—L., "Sp. Nat." 10th ed., p. 926 (1759) (fig. Rechb. "Ic. Crit." vi. 571).

Hab.: Tyrol, Lombardy, &c.

Large whitish leaves; capitate and axillary heads of flowers; for rockeries, but rather ugly.

petrophila.—Rup. in "Bull. Acad. Pétersb." xi. (1867), 212.

Hab.: Caucasus.

In the way of **rhomboidalis**.

phrygia.—J. and Spr., "Ill. Pl. Or." iii. 42 (fig. Jaubert, "Illust." 233).

Hab.: Thessaly, Isle Thasos.

A small species nearly allied to **Loeflingii**.

phyetidocalyx.—Boiss. and Noé, "Diag." ser. ii., iii. 114 (fig. "Mon. Jard. Bot. Tiflis," i. p. 14).

Hab.: Armenia.

A pretty and entirely new introduction, quite hardy, but not a good doer outside; flowers well in greenhouse or frame. See "Gardening World," 1905, p. 464.

pilosa.—Pall. ex Rœm. & Sch., "Syst." v. 148.

Hab.: North America, Siberia.

A very beautiful small species with large solitary flowers.

pilosa.—Ledeb., "Fl. Ross." ii. 894 = **Adenophora tricuspidata**.

pinifolia.—Nechtr. in Herb. Kew.

Hab.: Servia.

In the way of **rotundifolia**, but very small filiform leaves.

pinifolia.—Verkot in "Rad. Jugos Akad. Zagr." lvii. (1881), 92 = **patula**.

planiflora.—Lam. "Enc." i. 580 (fig. Roberti "Icones Plant.," part i. [no number], as *C. americana minor*).

(Syn. *nitida*, Ait. "Hort. Kew." i. 346 [1810].)

Var. *alba*.

Var. *fl. pl.*

Hab.: North America.

This is a compact, rigid, small plant (about one foot high); leaves small, coriaceous, glabrous, sessile, linear-oblong, crenated; flowers $\frac{3}{4}$ inch diameter, flat, racemose or solitary on axillary peduncles.

There are two dried specimens from North America in the Kew Herbarium. The figure in Roberti's folio work, quoted by Aiton, is excellent, and well represents the Kew specimens. It has been stated that **planiflora** (or *nitida*) is only a stunted form of **pyramidalis**, and **planiflora** is given as a synonym of **pyramidalis** (with a query) in the "Index Kewensis." The leaves of the American plant, however, are very distinct from that species, which, besides, is not an American plant. The true plant (both blue and white varieties) is in cultivation in several of our nurseries.

Portenschlagiana.—Rœm. and Sch., "Syst. Veg." v. p. 93 (1819) (fig. "Bot. Reg." 1995).

(Syn. *muralis*, Portens., 1830.)

Var. *major*; a large form called **bavarica**.

A most useful species for rockeries or pots; grows well on walls.

There is a white-flowering variety.

primulaefolia.—Brot., "Fl. Lusit." i. 288 (1804) = **peregrina**.

ptarmicaefolia.—Lam., "Ann. Mus." ii. 6; "Enc." i. 870 (fig. "Ann. Mus." ii. 6).

Hab.: Erzerroom.

A curious species; leaves radical, linear; flowering spikes long; flowers sessile or capitate.

pubescens.—Sch., Rehb., "Fl. Germ." 2013 = **caespitosa**.

pubiflora.—Rupr. in "Bull. Acad. Pétersb." xi. 207 = **Aucheri**.

pulcherrima.—Sch. et Zeyh. ex "St. Nom." 2nd ed., i. 269.

I have never seen this species, or been able to find the description of it or its habitat. I mention it here, as the name is in several catalogues; but when received and grown by me it has turned out **rapunculoides**.

pulla.—L., "Sp. Pl." 1st ed., p. 163 (1753) (fig. "Bot. Mag." t. 7358).

Hab.: Alps, Tyrol, Styria, &c.

One of the prettiest little species for rockeries or pots; flowers deep blue; requires a deep rich soil; division and repotting after flowering.

pulloides.—"Garden," 1904, lxvi. 203, 255. Sport or hybrid; a lovely rockery plant with larger flowers than **pulla**.

G. F. Wilson.—Garden origin; supposed to be a hybrid off **pulla** and small form of **turbinata**; a beautiful little plant for rockeries or pot culture; flowers early in June; requires a deep, rich heavy soil and top-dressing after flowering. It was in cultivation under the name of **Balfouri**, before named, as above.

G. F. Wilson var. *nana* is a dwarfer form, with smaller narrower leaves, sometimes called *aurea*, as the leaves get a yellow tint.

pulvinaris.—Hausskn. and Bor., in "Mittd. Thüring. Bot. Ver." n.s. xx. p. 29.

Hab.: Cappadocia.

A pretty little species with very small linear leaves and large flowers.

pumila.—Sims, "Bot. Mag." xv. 512 = **caespitosa**.

punctata.—Lam., "Enc." i. 586 (1783) (fig. "Bot. Mag." 41, t. 1723).
(Syn. *nobilis*, Ldl., "Bot. Reg." 32, 65 [1846].)

Var. *alba*, "Fl. D. Serres," vi. 563.

Hab.: China, Japan, Amur.

A very handsome species. It succeeds well in pots in cool greenhouse or frame and flowers early. I have found it difficult to flower outside.

Burghalti.—? Garden form; origin not known. A very handsome plant—one of the best Campanulas for borders.

Van Houttei.—"R. H." 1878, 420. ? Garden form; origin not known; very similar to **Burghalti**—scarcely differing except in the colour of the flowers.

These two Campanulas, both in their leaves and flowers, come very near **punctata**. If compared with the figure of **nobilis** in "Bot. Reg." xxxii. p. 65, it will be seen how closely they are allied; they are, I believe, only sports, or glorified forms of **punctata**, the older name for *nobilis*. There is a very large series of specimens of **punctata** in the Kew Herbarium from China and Japan; some of the specimens from Manchuria come very close to **Van Houttei**, if they are not the same. All we know of the origin of the latter is that it was first sent out from the nurseries at Sceaux. It is of much stronger growth than the **punctata** of our gardens, and much freer in flowering, otherwise there is little difference.

pusilla.—Haenke in "Jac. Coll." ii. p. 79 (1788) = **caespitosa**.

pyramidalis.—L., "Sp. Pl." 164 (fig. Rchb. "Ic. Fl. Germ." xix. t. 1612).

Var. *alba*.

Hab.: Europe.

Biennial. A grand species for borders and pots, easily raised from seed, and universally grown.

The four species which follow are only of botanical interest:—

parnassica.—Boiss., A. Spr., "Diagn. Pl. Or." vii. p. 17. Mt. Parnassus, 6,000 feet.

perpusilla.—DC., "Prod." vii. 474. Syria, &c.

preanthoides.—Durand in "Jour. Acad. Sc. Philad." ser. ii., iii. (1855), 93. California and Rocky Mts.

propinqua.—F. and M. Ind., "Sem. Hort. Petrop." ii. (1835), 32.

Hab.: S. Syria (= *pestalozzia*, Boiss. "Diag." ser. i., xi. 62).

Raddeana.—Trantv in "Bull. Acad. Pétersb." x. (1866), 395.

Hab.: Caucasus.

A new introduction, a low-growing valuable species for rockeries; flowers large, blue; easy from division, as the plant spreads rather rapidly.

Radula.—Fisch. "ex Tch. As. Minor Bot." ii. 395.

(Syn. *coriacea* Boiss. et Kots. ex "Fl. Or." iii. 910.)

Var. *B. minor*.

Hab.: Greece.

A fine, tall species for borders; leaves oval, coriaceous.

Rainerii.—Perpenti in "Bibliott. Ital." Jan. (1817) (fig. "Fl. Acad. Serres," 1908).

Hab.: Austro-Hungary, Italy, near Lake Como.

A beautiful little species for rockeries or pots. It requires a well-drained pocket and a very gritty soil; flowers large: easy from division; slugs and damp most destructive; easy in pots with the same sort of soil. There are two varieties. The variety with smaller leaves and flowers (var. *nana*) is not so easy to cultivate as the larger form.

ramosissima.—Sibth., "Fl. Gr." t. 204, and "Prod." i. p. 137 (1806) (fig. "Rev. Hort." 1903, p. 94).

(Syn. *Loreyi* Pollini, 1811; "Bot. Mag." 52, 2581.)

Hab.: Italy, near Mantua on river Mincio (fine variety). Greece, Dalmatia, Palestine.

A pretty annual, a variable species; flowers white or blue.

rapunculoides.—L., "Sp. Pl." 165 (fig. "Eng. Bot." 3rd ed., t. 869).

Hab.: England, Europe.

A well-known border plant, often a nuisance in borders, as it spreads everywhere.

Var. *janisensis*, Sch.

Hab.: Siberia. Leaves more sharply serrated; flowers larger.

Rapunculus.—L., "Sp. Pl." 164 (fig. "Fl. Dan." v. 855; "Eng. Bot." iv. 283).

(Syn. *verruculosa* Link. and H., "Fl. Port." ii. 12, t. 81.)

Var. *Lambertiana*, DC., "Mon. Camp." 327.

Hab.: England, Warwick, &c.; Portugal, Switzerland, Apennines, Morocco.

Biennial; a variable species; there is a hairy form.

Regina.—Alboff in "Nature," liv. (1896), 46 = **mirabilis**.

retrorsa.—Labill., "Ic. Pl. Syr. Dec." v. 5.

Hab.: Syria, Mersina.

A pretty annual in the way of **Lceflingii**.

Reuteriana.—Boiss., "Diagn." ser. ii., iii. 1108.

Hab.: Kurdistan, Asia Minor.

Closely allied to **strigosa**.

rhomboidalis.—L., "Sp. Pl." 165 (fig. "Journ. Hort." Ser. iii., L. p. 541; fig. Rchb. "Ic. Fl. Germ." xix. 1598).

(Syn. *azurea*, Soland and Banks ex Sims, "Bot. Mag." t. 551.)

Var. *reflexa*.

Var. *lanceolata*, Lap., "Hist. Pl. Pyr." 105. Leaves narrower.

(Syn. *pseudo-lanceolata*, Pantocsk. Pyrenees.)

Hab.: Europe, Alps, &c.

A valuable plant for rockeries.

Riverslea, "Journ. Roy. Hort. Soc." xxv. 1900. See under **carpatica**.

Rosani.—"Ten. Nap." iii. 205, t. 120 = **versicolor**.

rotundifolia.—L., "Sp. Pl." 163 (fig. Michx., U.S. ii. t. 3; "Eng. Bot." xiii. 866).

(Syn. *antirrhina*, Sch. "Pl. Harv." 3rd ed., 10.)

Var. *alba*.

Var. *fl. pl.*

Var. *Hostii*, Baumg. "En St. Trans." iii. 342. A larger and finer variety.

Var. *Hostii alba*.

Var. *Baumgartenii* = var. *Hostii*.

Var. *soldanelliflora* (fig. Nichols, "Dict. Gard." i. p. 257).

Hab.: England, Europe.

A very variable species: **stenocodon**, **linifolia**, and perhaps several other supposed species are probably only forms of it. **Warleyi**, "Garden," 1899, lvi. 89, 92, a plant of doubtful origin probably falls in here. It has semi-double blue flowers, and is a desirable plant. Miss Willmott, who raised it, informs me that it sprang up as a sport or natural hybrid where **rotundifolia** and **fragilis** were growing.

rupestris.—Sibth., "Fl. Gr." 213.

Hab.: Mt. Hymettus in Attica, Crete.

Biennial; one of the lyrate-leaved section, nearly allied to **lyrata**, **anchusaefolia**, and **tomentosa**.

rupicola.—Boiss., "Fl. Or." iii. 908.

Hab.: Greece, on mountains 4,500–6,500 feet.

? Annual.

ruthenica.—M. B., "Bot. Mag." liii. 2653. See **bononiensis**.

The four species which follow are only of botanical interest:—

radicosa.—Bory. and Chaub., "Fl. Pelop." 14, t. 7. Mt. Parnassus.

revitchoni.—A. Gray, "Syn. Fl. N. Amer." i. 396. Texas.

rimarum.—Boiss., "Fl. Or." iii. 901. Syria.

ruderalis.—Aitch. and Hems., "Journ. Linn. Soc." xix. (1882), 174. Afghanistan 9,000–12,000 feet.

sabatia.—De Not., "Prod. Fl. Lig." 52.

Hab.: Italy, Naples, Liguria.

Closely allied to **macrorrhiza**.

sarmatica.—Ker. Gawl. "Bot. Reg." t. 237 (fig. "Bot. Reg." t. 237).

(Syn. *gummifera*, Willd. in Rœm. and Sch. "Syst." v. 144.)

Hab.: Caucasus, Smyrna.

A good species for borders.

saxatilis.—L., "Enc." i. 588 (fig. Jaubert, "Illustr." 392).

Hab.: Greece, Isle of Karpatos.

A small, very pretty species, allied to **orphanidea**.

Saxifraga.—M. and Bieb., "Fl. Taur. Cauc." i. 155 (fig. DC. "Mon. Camp." t. 70).

Hab.: Caucasus.

A pretty species, very near **tridentata**.

Scheuchzeri.—Villars, "Prosp." p. 22, et Dauph. ii. p. 503, t. x. (fig. "Fl. d. Serres," 2205).

Hab.: Engadine Valley, Tyrol, Pyrenees.

A very pretty species for borders or rockeries, very near **linifolia**, some of the finer forms of which seem to run into it.

sclerotricha.—Boiss., "Diagn." ser. i., xi. 66.

Hab.: Kurdistan.

A large species, in the way of **Grossekii** and **Trachelium**.

scutellata.—Griseb., "Hort. Vind." i. p. 22 (1770).

Hab.: Thessaly, Greece, Servia.

Annual; a fine species allied to **linifolia**, but flowers larger.

serotina.—Wettstein, "Vienna Bot. Garden."

This is apparently an unpublished name. It is in cultivation at Kew (received from Vienna) in the way of **glomerata**, but a biennial, I believe.

serpyllifolia=**Wahlenbergia serpyllifolia**.

sibirica.—L., "Sp. Pl." 1st ed., p. 167 (fig. "Bot. Mag." 659; "Reg. Sert. Petrop." 25).

(Syn. *caucasica*, Bieb., "Casp." 140.)

Var. *divergens*, "Gard. Chron." 1894, xiii. 597; Willd. "Hort. Ber." i. 212.

(Syn. *spathulata*, W. K., "Ic." iii. p. 286, tab. 258.)

Hab.: Europe, Temperate Asia.

Biennial. The variety *divergens* is a useful species for rockeries.

sidoniensis.—Boiss. et Blanche in "Bois. Diagn." ser. ii., iii. 114.

Hab.: Palestine, Sidon, &c.

In the way of **abietina**; straggling habit; flowers large.

silenifolia.—Fisch., DC., "Mon. Camp." 320.

Hab.: Siberia, the region north of the Caspian Sea.

A tall fine species in the way of **Steveni**; leaves linear, glabrous; flowers large.

Smithii.—"R.H.S. Proc." July 15, 1874. A sport or hybrid said to have sprung up in a frame where **fragilis** and **caespitosa** were grown. Granted a First-class Certificate on the above date. Probably lost to cultivation. Raised by Mr. Smith, Willmott Road, Leyton; dwarf plant; leaves small, hairy; stems erect, hairy, six inches high, with a profusion of semi-erect greyish-blue flowers.

solstitialis.—Kerner in "Vern. der zool.-bot. Ges. in Wien," xxviii. p. 669 (1888).

Hab.: Austria.

Closely allied to **linifolia**, and probably only a form of it.

spathulata.—Sibth., "Fl. Gr. Præd." i. 137.

Hab.: Attica, Greece.

Closely allied to **Spruneriana**.

spathulata.—W. K., "Ic." iii. p. 286=**sibirica** var. *divergens*.

speciosa.—Pourr. in "Mém. Acad. Sc. Toul." iii. (1788), 309 (fig. Willk. "Ill. Fl. Hisp." t. 44); "Bot. Mag." 2649.

Hab.: S.W. Europe, Pyrenees.

A very handsome species with large flowers, not very easy to grow.

sphaerotherix.—Griseb. (1841), "Spicil. Fl. Rumel." ii. 280=**expansa**.

spicata.—L., "Sp. Pl." 1st ed., p. 166 (1753) (fig. Rechb. "Ic. Fl. Germ." xix. t. 1597); "Journ. Hort." ser. iii., xlvii. p. 264.

Hab.: Tyrol.

Annual. An interesting species with very narrow leaves, easily raised from seed.

An interesting hybrid between this species and **thyrsoïdes** was raised at Kew in 1897; character exactly intermediate between the two. See specimen in the Kew Herbarium.

Spruneriana.—Hampe in "Fl." xxv. 1842, i. 76.

Hab.: Thessaly.

A fine species in the way of **linifolia**. Calyx segments very long and filiform.

Stansfieldi.—The "Craven Nursery Cat." 1906.

A very beautiful small *Campanula* sent out recently by the above nursery, said to be a hybrid between **Tommasiniana** and **carpatica**. Vide "The Garden" Aug. 9, 1902. There is, however, nothing of **carpatica** in it; it is like a glorified **Waldsteiniana** with the flowers and leaves much larger; it is an easily grown species, divides well, and grows from cuttings of the young growth in the spring. I find in the Kew Herbarium a dried specimen of what appears to be the same plant without a name, collected by D. K. Vandoz on hills at Plasa, near Jablinsca, Herzegovina. This is not far from the localities for **Waldsteiniana**. This *Campanula* will become a popular one for pot culture.

stenocodon.—B., "Reut. Diag." ser. ii., iii. 112.

Hab.: The Alps.

Very near **rotundifolia**, probably a delicate form of that species.

stenosiphon.—Boiss. & Held., "Diag." ser. vii. 18 = **glomerata**.

Steveni.—M. Bieb., "Fl. Taur." iii. 138.

(Syn. *infundibulum*, Vest. ex Rœm. & Sch. "Syst." v. 106; *simplex*, Steven in "Mém. Soc. Nat. Mosc." iii. 255, 1812; *altaica*, Ledeb., "Ind. Sem. Hor. Dorpat," 1824, 2.)

Hab.: Armenia, Mt. Vitosha, Bulgaria; Caucasus, Persia.

A valuable small but little known species. A perennial which spreads and divides well, a pretty pot-plant, a pan with ten or twelve seedlings trained up little sticks being a fascinating object; it seeds well and germinates freely.

stricta.—L., "Sp. Pl." 2nd ed., 288 (fig. "Ann. Mus." ii. 13).

Var. *libanotica*, smaller and stunted. Syria.

Hab.: Asia Minor, Erzerum, Armenia: 4,800–6,000 feet.

A fine, tall, woody species; large flowers; very narrow, scabrous leaves.

strigosa.—Vahl., "Symb. Bot." iii. 34 (fig. "Bot. Mag." 5068).

Hab.: Palestine, Taurus Mountains, Asia Minor, Mersina, near Tarsus; Mesopotamia.

A pretty little hairy plant; leaves linear, lanceolate, scabrous; flowers large; very common in Palestine.

subpyrenaica.—Timb. in "Mém. Acad. Toul." ser. iv., v. (1855), 387.

Hab.: Spain.

Leaves very long, linear; flowers few, terminal, very large.

subramulosa.—Jord. in Grev. & Godr. "Fl. Fr." ii. 418 = **caespitosa**.

sulphurea.—Boiss., "Diag." ser. i., xi. 64 (fig. "Garden," Aug. 30, 1902).
Hab.: Syria, Beyrout, &c.

A charming annual with bright yellow flowers. For effect it should be planted in groups of eight to twelve.

The eight species which follow are only of botanical interest:—

scabrella.—Eng. in "Coult. Bot. Gaz." vi. 237 (1881). Delaware.

Scouleri.—Hook., DC., "Mon. Camp." 372. Washington.

singarensis.—Boiss., "Fl. Or." Nov.-Dec., 1-2. Mesopotamia. Annual.

specularioides.—Coss., "Notes Crit." 41. Spain. Annual.

stellaris.—Boiss., "Diag." ser. i., xi. 63. Beyrout. Annual; like **dichotoma**.

subalpina.—Hausskn. in "Herb. Kew." Thessaly.

sylvatica.—Wall., "Cat." 1293. Himalayas.

sypsiensis.—A. Koch in "Linnæa," xxiii. 639 (1850). Kurdistan.

tenella.—Jord., "Pugill. Pl. Nov." 1852, 125=**caespitosa**.

tenori.—Mor. "Prosp. Geogr. Bot. Ital." 19=**versicolor**.

thyrsoïdes.—L., "Sp. Pl." 167 (fig. "Bot. Mag." t. 1290).

Hab.: Alps.

Biennial. For the rockery; more curious than beautiful; flowers yellowish; requires a well-drained soil with lime rubbish.

tomentosa.—Vent., "Hort. Cel." 18 (fig. Boiss. "Fl. Or." iii. 897).

(Syn. *Celsii*, DC., "Mon. Camp." 217.)

Hab.: Greece, hills in Attica up to 2,000 feet.

A variable species of the lyrate-leaved section; the tomentum is sometimes quite white.

Tommasiniana.—"Reut. Cat. Hort. Genw." 1865 (fig. "Bot. Mag." 6590).

(Syn. *Waldsteiniana* var. *Freyeri*.)

Hab.: Istria, mountains south of Trieste.

A valuable species for the rockery; a good grower and in time becoming a large plant (as seen in the Kew Rockery). Charming for pots; quite distinct from **Waldsteiniana**, which is sometimes sent out for it from nurseries: in this the bells are very narrow, in **Waldsteiniana** broad. The leaves, too, are quite different: in this linear and rather thick in texture, in **Waldsteiniana** oval; it has been stated that there are intermediates, but I have not seen such; they are probably hybrids or sports.

trachelioides.—Mumby in "Bull. Soc. Bot. Fr." ii. 285 (1855) (fig. "Rehb. Pl. Crit." vi. 508).

Hab.: North Africa.

A large coarse species.

Trachelium.—L., "Sp. Pl." 166 (fig. "Eng. Bot." 3rd ed., t. 867).

(Syn. *urticaefolia*, "Sch. Fl. Boem." ii. 73.)

Var. *caerulea fl. pl.*

Var. *alba*.

Var. *alba fl. pl.*

Hab.: Europe, Tyrol, Bohemia, &c., North Africa.

Very common in gardens.

trichocalycina.—Tenor., "Fl. Nap." i. 67, t. 16.

Hab.: Crete, Montenegro.

Placed lately in **Phyteuma** on account of its rotate corolla, but seems to have equal right to be a **Campanula**.

trichyphylla.—Schott and Kotschy in "Boiss. Fl. Or." iii. 926.

(Syn. *intypus*. S. and K. ex Tchip. "Asia Minor Bot." ii. 402.)

Hab.: Asia Minor: 7,000 feet.

A tall woody species with capitate flowers.

tridentata.—L., "Mant." i. 44 (fig. "Schreber Ic." 2).

(Syn. *ciliata*, Stevens in "Mem. Sc. Nat. Hist." iii. [1872]; *Biebersteiniana*, DC., Rœm. & Sch. "Syst." v. 147.)

Hab.: Greece, Caucasus, Asia Minor.

A small tufted plant; leaves narrow, ligulate; flowers large, solitary.

tubulosa.—Lam., "Enc." i. 588 = **corymbosa**.

turbinata.—"Gartenfl." 831. See **carpatica**.

Tymonsii = *Hendersoni*. See under **carpatica**.

tyrolensis.—Schott, Nym. & Kots. "Analect. Bot." 12 = **caespitosa**.

The three species which follow are only of botanical interest:—

teucrioides.—Boiss. in "Diagn. Pl. Or." iv. p. 33. Caucasus.

tricopoda.—Boiss., "Diagn." ser. i., xi. 68. Syria.

tymphaea.—Haussk. in "Mith. Thür. Bot. Ver." v. 87. Thessaly.

uniflora.—L., "Sp. Pl." 163; L., "Fl. Lapp." 9.

Hab.: Colorado, North America, North Russia, Greenland.

A beautiful little plant, with solitary medium-sized terminal flowers.

valdensis.—"Pl. Ped." iii. t. 6. See **linifolia**.

Van Houttei.—"Hort." See under **punctata**.

Velenooskyi.—Adamov in "Oest. Bot. Zeit." xlii. (1892), 408.

Hab.: Servia.

A fine species in the way of **rotundifolia**, but very large flowers; lower leaves oval, long-petioled; upper ones linear, sessile.

velutina.—Desf., "Fl. Attic." i. 180, 51 = **mollis**.

velutina.—Vel., "Fl. Bulg." i. 365 = **lanata**.

versicolor.—Sibth., "Fl. Gr." tab. 207.

(Syn. *rosani*, Ten., "Fl. Nap." iii. 205, t. 120; *tenori*, Mor., "Prosp. Geogr. Bot. Ital." 19.)

Var. *tomentella*. A soft downy var. Macedonia.

Hab.: Italy, Greece.

A valuable species; like small **pyramidalis**; flowers various shades of blue and lilac.

vesula.—All., "Fl. Pedem." i. 108 = **persicifolia**.

Vidalii.—H. C. Watson in "Hook. Ic. Pl." t. 684 (fig. "Paxt. Fl. Gard." iii. p. 131, f. 296).

Hab.: Azores.

A fine greenhouse perennial for pots.

Waldsteiniana.—Rœm. and Sch., "Syst. Veg." v. p. 99 (1819) (fig. "Rehb. Ic. Fl. Ger." xix. t. 1601).

Hab. : Croatia, 5,000 feet ; Dalmatia at Zara.

One of the smallest species ; rather variable in the size of its leaves and flowers ; a lovely pot-plant, apt to disappear in the rockery unless constantly attended to ; it divides well and grows readily from cuttings taken near the root in spring.

Waldsteiniana var. *Freyeri* = **Tommasiniana**.

Warleyi.—"Garden," 1899, LVI. 89, 92. See under **rotundifolia**.

Welandii.—Heuff. in "Oest. Bot. Woch." (1857), 118 = **expansa**.

Wiegandi.—See under **Medium**.

Zoysii.—Wulf. in "Jacq. Collect." ii. 122 ; "Ic." t. 334 (fig. "Journ. Roy. Hort. Soc." xxvii. p. 122, ex. "The Garden").

Hab. : Carnic Alps in Italy, Servia, &c.

A charming little species, rather difficult to manage. It succeeds best in pots in very gritty soil between stones ; it soon disappears in the rockery unless constantly looked after.

The above list does not of course include the genera *Platycodon*, *Symphyandra*, *Wahlenbergia*, and *Adenophora*, which give to our gardens many beautiful species much loved by gardeners, and closely allied to *Campanula*.

A FURTHER COMMUNICATION ON THE CULTIVATION OF GRAPES IN DAULATABAD.*

By SYED SIRAJ-UL-HASAN.

HISTORY tells us that the culture of fruit trees, such as figs, grapes, &c., began at Daulatabad as long ago as the time of Mohammad Tagluq (A.D. 1335). Such was the emperor's fondness for fruits that when Daulatabad became his capital different kinds of fruit trees were brought to the place by his order on camels and elephants at an enormous cost. After this, garden-making became the rage. Everyone, rich and poor, wished to own a pleasure garden; and, in consequence, gardens sprang up everywhere round Daulatabad. Naturally, gardeners, as a class, flourished. They came from distant countries, filling a village still known as Maliwada, with a present population of 1,303. On the death of Tagluq the capital was retransferred to Delhi, and this event had a disastrous effect on the gardeners, whose numbers and prosperity gradually became less. For a long time afterwards Daulatabad and its gardens remained in obscurity. Fortunately this was not always to be. During the time of the Bahmani kings (A.D. 1436), Daulatabad became a military station under Parwiz-bin-Karanful. Once, again, the people began to pay attention to gardening, growing, however, only those kinds of vines that had survived the neglect of previous years.

This state of things continued till A.D. 1685, when Aurangabad became the capital of Aurangzeb. The city grew rapidly, and with it the demand for all sorts of luxuries. The Aurangzeb army was largely made up of Persian emigrants, who were great fruit eaters. The consequent demand for grapes was so great that Daulatabad alone was not able to supply it. So, in the course of time, vineyards extended to British Chikalhana and Kannad on one side and to Bir and Parbhani on the other. In Daulatabad itself the passion for cultivating vines knew no bounds. Places of recreation provided by noblemen in their own gardens were entirely covered with vines. Even Fakirs looked upon the vine as a gift from Paradise, and had their mosques and monasteries adorned with it. Jamab Baba Shah Musafir Saheb procured the best varieties from Kabul and Bukhara, and planted over seven acres of land with them at Daulatabad. This plantation still exists under the name of Pandhri, the property of Syed Shah Gulam Mohammad Saheb. It is said that in those days a vine yielded 123 lb. of grapes, and a fig tree as much as 63 lb. of fruit, and that the owners of plantations made very large profits. The last statement may be easily believed, considering that the fame of Daulatabad fruits had spread, and there was great demand for them in Khandesh, and even in far-away Ahmedabad and Surat. Several foreign travellers vouch for the fact that from Ajanta to Daulatabad there was one continuous line of gardens producing

* For previous communication see JOURN.R.H.S. vol. xxix. p. 671.

the best varieties of fruits, such as grapes, figs, peaches, &c., in abundance. From this prosperity to the present deplorable condition of these plantations is a great change. Various causes, however, conspired to bring it about. About the middle of the seventeenth century Aurangabad ceased to be the capital, Hyderabad taking its place. The nobility, of course, changed their abode, and in their wake followed the representatives of the arts and professions which had made Aurangabad famous. Capital was never plentiful among the ordinary cultivators, and vineyards required a large outlay. Nor were they paying any longer. Moreover, the old facilities for irrigation dwindled away gradually, for the watercourse of Abpashidara, which runs as an open channel through the fort and town, and in front of the Paithan Gate, was in places provided with dams of masonry, and the lands adjoining these received sufficient water for irrigation purposes. The wells also of the gardens close by were full owing to underground springs; and the embankments of the watercourse seem to have been in pretty good condition till about this time (for I am told it was on that account that certain lands were assessed for water rates, which the owners continue to pay, though the springs have long since run dry). Afterwards they fell into ruins, cutting off one chief source of irrigation to the gardens around. The rainfall was seldom sufficient. Under such difficulties few gardeners could pursue their old occupation for any length of time. As a matter of fact, they would have disappeared entirely but for two of the chief officials here coming to their rescue. Nawab Mukhtar Jung Bahadur, a former Subadar of Aurangabad, who took special pains to preserve and improve the old arts and industries, gave them substantial help by advancing money in 1883. This enabled them to keep their gardens going till about 1889. But the famine of 1892 proved the ruin of most of them. Vine and fig plants were sold for fuel in the market, and where these grew millet and Bajri (*Holcus spicatus*), a grass grown for its seed, are sown now. If any gardens have survived the calamity the credit is solely due to Nawab Bashir Nawaz Jung Bahadur, the present Subadar of Aurangabad. All concerned acknowledge that the Nawab's private purse has saved these from extinction.

The writer of this article has inspected several gardens in Daulatabad. Most of these are going out of cultivation, only three or four being in a fairly good condition. Among the latter the Chiman Garden, so named after the owner, deserves prominent mention on account of the large number and the good condition of the plants in it: it contains 425 vines and several plantations of fig trees. Most of the vines are of the Fukhri variety, and some few Sahabi. But the owner is reduced to poverty, and if he is not saved from the clutches of the Sahukars (money-lenders) his garden will soon be a thing of the past. Next comes the garden belonging to Syed Gafur. Being in difficulties, the Syed lately sold it to a "devotee" for the paltry sum of £3 7s. Then there is Jivaji Mali Garden, with nearly 200 vines. But Jivaji shares the hard circumstances of his class, and his garden, too, will go the way that others have.

The Government gardens, known as Rasheed Gardens, Daulat Gardens, and Nagar-talab Gardens, are all in the most deplorable condition, and are more an encumbrance than a source of profit to the

Government. The growth of the plants in them is so poor that one might imagine them to have been only recently planted. Yet these are the gardens that sent out the famous grapes which were in such great request at the palaces of kings and noblemen in distant lands.

The subjoined statements show the numbers and condition of the gardens still in existence. But they are not altogether discouraging. There is still some life left in most of the gardens, and with a little attention on the part of the high officials the flourishing industry of former days might be revived.

Three causes have brought about the decline of these gardens, viz. want of demand for the fruit, reduced facilities for irrigation, and want of capital.

The first depends upon many things, and needs to be dealt with at length, especially as it is intimately connected with the question of the improvement of agriculture and the prosperity of trade. It is a commonplace of economics that demand determines the supply. But the word "demand" is not to be taken in a narrow sense. When travelling was difficult and means of communication scanty, the export as well as the import of perishable articles was impossible. So the producer had to find a market for his goods in the place where he lived; and when, from some reason or other, the population of the place diminished, or the well-to-do classes left it, he suffered. Either he could not sell all the produce he had on hand, or he had to keep down his supply to the extent of the demand. Either way he was a loser. All this was changed by the introduction of the railway and the telegraph. Now, demand means, not demand in one or two places only, but a demand all over the area connected by the railway and the telegraph. The enterprising producer has a market open to him almost everywhere. Unfortunately, however, his Highness's subjects could not profit by the altered conditions of trade, and what Aurangabad lost other places gained. It is well known that the prosperity of the gardens of Nasik, Poona, and Bangalore is due in a large measure to the reduction in the fruit supply from Daulatabad. The planters of Nasik and Poona took lessons in their art from their brethren there. Daulatabad gardeners worked for them, and their plants also were raised from Daulatabad cuttings. But the fruit industry has ceased to bring any profit to the local people. The price list of the great Indian markets clearly indicates the reason. The Bombay list alone mentions Aurangabad, and there it stands first in the first class. Since the opening of the Hyderabad-Godavery Valley Railway line the demand has certainly risen for our fruit; but fruit is scarce.

Looking at the present condition of the fruit trade at Poona and Nasik, one realises what treasure lies buried in Aurangabad and its vicinity. These two places send fruit to the value of many lakhs of rupees to the Bombay market. The writer has personally seen the thousands of acres of lands under vine cultivation round Nasik. One merchant alone—a Bohra—exports as much as £33,000 worth of fruit. Why should not Aurangabad compete with the other cities on equal terms? The soil is excellent, as proved by the experience of centuries.

The second reason for the decline of the Daulatabad gardens is, as stated above, reduced facilities for irrigation. There are as many as forty-two

wells in Daulatabad, besides a large artificial lake. But they have insufficient water. Most of the old conduits have gone out of use for want of repairs, and the water running through them goes to waste. The Government could soon renovate these, and at inconsiderable cost.

We must now deal with the third cause of decline, viz. "want of capital." Grape growers are, as a rule, extremely poor. One reason is their thriftlessness. Being very extravagant on occasions of marriage and death, they are unable to buy even the implements necessary with their own money. They must needs, therefore, go to the Sahukar for help, and once they are in the hands of the latter, they are done for. The Sahukar generally prefers to have arable fields for his money, because he can realise the crops so much easier at harvest time. Besides, the cultivation of vines involves much care in the way of irrigation, manuring, pruning, and gathering for despatch to market at the proper time, and he is not endued with the patience and knowledge necessary for all this. So whenever he gets hold of a vineyard he immediately sets about turning it into an arable field. Government might make some provision against this sort of thing happening. The money advances sanctioned by Government are no doubt sufficient. But the vine growers do not seem to get the benefit of them, though I cannot see why they should not receive them as well as other cultivators.

Three things are necessary for growing figs, grapes, peaches, mulberries, &c., namely: good soil, good facilities for irrigation, and enough capital with which to work.

Nearly 300 square miles of land, between 2,000 and 3,000 feet above the sea-level, around Aurangabad, comprising Daulatabad, Khuldabad, Chikalthana, Kannad, Badnapur, Pimpri, &c., are admirably suited for the cultivation of fruit trees and plants, as well as for breeding silkworms. About sixteen years ago a missionary carried on sericulture with the greatest success, and the cultivation of coffee was equally successful.

The sources of irrigation are also not wanting if the Government only knew where to find them. There are twenty-two watercourses around Aurangabad. Many of them, such as the Palsi Watercourse, could be utilised for this purpose if a few thousand rupees were spent over them. Near Daulatabad there is a large reservoir as well as a watercourse. If they were repaired, they would be of immense service to the gardens in the vicinity. Between Daulatabad and Khuldabad there are four Talabs (reservoirs)—the Roza and Kazipura Reservoirs—out of repair. They could also be restored. All this work could be done economically if entrusted to the Tahsildars. The Public Works Department, however, would be likely to raise the cost unnecessarily.

The financial condition of the proprietors of gardens could be improved in various ways. A number of wells should be repaired for their special benefit, and cuttings of figs and vines supplied to them gratis to be planted in their gardens. Besides this, advances of money may be given to those who are likely to use them for the improvement of their gardens. And there are, I am sure, many such men.

If these steps were taken, there is not the slightest doubt that the revival of the old fruit industry would be an accomplished fact ere long,

and Daulatabad would recover its lost place and fame in the fruit markets of the Deccan.

Since submitting the foregoing memorandum on grape culture in Daulatabad the Government have been pleased to grant an advance of money to the extent of £176 to such persons as have begun the cultivation of grapes.

I have dwelt fully on the various causes that have brought the industry to its present deplorable condition, laying special stress on the state of tanks, reservoirs, and water channels. The inhabitants of Daulatabad appreciate this difficulty to such an extent that they have submitted several petitions praying for a grant for restoring a reservoir, and expressing their own willingness to contribute towards its expense from their own small means and by personal labour. I brought their request to the special notice of the Subadar and the local board with a recommendation that such works undertaken by the villagers themselves should be encouraged by the authorities by every means. The matter, I regret to observe, has not yet been dealt with.

Since preparing my memorandum I have studied the present state of grape cultivation in Western India, Mysore, and Cashmere. The question of successful vine growing has been under the consideration of the Durbars of Mysore and Cashmere for some time. It has been proved beyond doubt that certain diseases have attacked vineyards in India in the same manner as they did in Italy and France, causing considerable damage to the industry. Again, such varieties as were imported on many occasions have deteriorated in quality considerably, as they are apt to do in a hot climate. Mr. Faridunji Jamshedji assures me, from his wide knowledge of the district, that such has undoubtedly been the case here. Under these circumstances it would be well to keep in view the facts above mentioned. If Government are pleased to decide in favour of reviving the industry which the climate and past associations have connected with the district of Aurangabad, it is highly advisable that measures should be adopted to suppress disease, and to introduce fresh and suitable varieties from other countries. The Royal Horticultural Society of London has preserved the better kinds of grape vine that flourished in India, which they are reintroducing into the country. Again, the Durbars of Mysore and Cashmere have imported into their gardens choice varieties from distant countries, and have made vine cultivation successful in India.

It is for this reason that I have been advocating the restoration of the Government gardens of Aurangabad. But it is absolutely necessary that at least one garden should be kept up-to-date and well equipped.

Over £470 is annually allotted from the local rates to gardens which can hardly be termed productive, useful, or decorative. One half of this sum properly spent, with a small occasional grant from Government, might serve the purpose and provide nurseries for the extension of fruit cultivation.

MENDEL'S LAW OF HEREDITY.

By C. C. HURST, F.L.S.

[Read before the Scientific Committee, on March 20th, 1906.]

MENDEL experimented with seven pairs of pure bred "characters" in peas, viz. yellow and green seeds (cotyledons), round and wrinkled seeds, purple and white flowers, tall and dwarf stems, inflated and constricted pods, green and yellow pods, axial and terminal flowers. In each pair, when crossed, Mendel found the first-named character dominant over the other, which he called recessive: *e.g.* yellow crossed with green gave seeds all with yellow cotyledons. In this case yellow is dominant over green, which is recessive.

Mendelian dominance has recently been found to hold good in a large number of characters in many species of plants and animals; *e.g.* in my own experiments I have found the following among many others (the dominant character is named first):—

Peas: Round and wrinkled seeds; yellow and green cotyledons.

Sweet Peas: Tall and dwarf stems (Cupid); long and round pollen grains.

Primula: Palm and fern leaf; thrum and pin-eyed.

Antirrhinum: Red and white flowers; white and yellow flowers.

Tomato: Red and yellow flesh; yellow and white skin of fruit.

Orchids: Spotted and striped flowers.

Poultry: Rose and single comb; white and black plumage.

Rabbits: Coloured and white coat; short and angora coat.

Horses: Bay and chestnut colour; brown and chestnut colour.

Recent experiments show that the phenomenon of complete dominance is by no means universal. In many cases the dominance is incomplete, distinct traces of the recessive character being visible in the crossbreds, *e.g.* in my poultry experiments white \times black plumage gave both clear white and white ticked with black, the dominance of white being incomplete in the latter case. In some cases hybrid characters appear to be intermediate between the parents, *e.g.* some characters in orchid hybrids.

In a few cases the hybrid characters are like neither parent, but appear to revert to an ancestral form, *e.g.* 'Black Knight' sweet pea \times 'Pink Cupid' gave all wild purple crossbreds. In a few cases, again, the hybrid characters are like neither parent, nor are they reversions, but give an apparently new character, *e.g.* the blue Andalusian fowl is a distinct hybrid breed between a black and a splashed white, and never breeds true. In nearly all the cases, however, so far as they have yet been investigated, Mendel's law of segregation and purity is evident. It is, moreover, evident that many of the so-called intermediate hybrids are really due to the association of two distinct dominant characters each with an independent Mendelian heredity.

MENDEL'S LAW OF SEGREGATION AND PURITY.

In the second generation, when the hybrid dominants were self-fertilised, Mendel found that segregation or splitting of the characters took place in the ratio of three dominants (D) to one recessive (R); *e.g.* the hybrid yellow peas, self-fertilised, gave on the average 75 per cent. yellows and 25 per cent. greens, both types often appearing in the same pod. The law of segregation was also confirmed in the above experiments with various plants and animals; the recessive character, after "skipping a generation," re-appeared apparently unchanged.

In the third generation Mendel found that the extracted recessives bred true, without reversion to their dominant parents or ancestors; *e.g.* the green peas extracted from the hybrid yellows bred true greens, with no trace of yellow. Mendel also tested the dominants of the second generation and found them to be of two kinds—in the ratio of one pure to two hybrid.

The pure dominants bred true, while the hybrid dominants segregated again into 3D : 1R; *e.g.* the yellows bred from the hybrid yellows were one-third pure yellows which bred true with no trace of green, and two-thirds hybrid yellows, which gave 75 per cent. yellows and 25 per cent. greens.

Mendel continued these experiments through several generations with the same result. The Mendelian formula for segregation is therefore 1DD : 2DR : 1RR, *i.e.* 25 per cent. pure dominants, 50 per cent. hybrid dominants, and 25 per cent. pure recessives.

The law of purity was also confirmed in the above experiments with various plants and animals, the extracted recessives in all cases breeding true, with no trace of the dominant parents and ancestors.

THE MENDELIAN THEORY.

Mendel did not apparently offer any explanation of the facts of dominance, nor has any satisfactory theory of dominance yet been propounded.

Mendel, however, brought forward a simple theory, which fully accounts for both the facts of segregation and purity, *viz.* the segregation of the gametes (germ-cells) of the hybrid, so that on the average one-half of the gametes carry the dominant character and one half the recessive character. No gamete carries both.

This is known as the theory of gametic segregation or gametic purity. On this hypothesis the gametic constitution of the offspring of the hybrid dominants ($D \times R$) will be on the average ($DR \times DR = 1DD : 2DR : 1RR$) 25 per cent. pure dominants, 50 per cent. hybrid dominants, and 25 per cent. pure recessives. This result is in close agreement with the actual numbers Mendel obtained in his experiments.

PRACTICAL APPLICATION OF THE MENDELIAN LAWS.

When the Mendelian characters coincide with the "points" desired by the breeder, as they do in many cases, a knowledge of Mendel's law will enable him to get what he wants in the shortest possible time. If the desired character is a recessive, it will breed true at sight.

If it is a dominant, several individuals may have to be bred from before the pure dominant is found; *but once found it will breed true*. When several Mendelian characters are desired in combination, a much larger number of individuals will be required to secure the pure form; but once found no "fixing" will be required; it breeds true at once. The old system of "fixing" by many years' selection leaves all to chance, and, in the light of present knowledge, is largely a waste of time.

When the desired "point" of the breeder is not a simple Mendelian character, but rather a compound one made up of more than the simple Mendelian unit, as is evident in certain cases, the breeder must rely on the assistance of the Mendelian experimenter, who will proceed to analyse it by exact methods. Once the Mendelian elements are discovered, the compound character will be as easily worked by the breeder as a simple one. The phenomenon of dominance apparently explains the oft-observed facts of characters "skipping a generation."

The facts of dominance show that the outward appearance of an individual is often no guide at all to its breeding potentialities, and that a knowledge of its gametic constitution is the only guide to its heredity. This can only be secured by a Mendelian analysis. Recent experiments with mice, rabbits, sweet peas, and stocks show clearly, *e.g.*, that the gametic constitution of albinos (whites) is often very complex.

When more than one pair of Mendelian characters are concerned in the cross, the average result can be easily calculated, *e.g.* a hybrid round yellow pea will give:

$$(3R + 1W) \times (3Y + 1G) = 9RY + 3RG + 3WY + 1WG.$$

Mendel's law shows the necessity of breeding from single individuals, or, if more than one be bred from, care should be taken that each individual of the batch has the same gametic constitution.

The facts of correlation or coupling of characters should be carefully watched and noted by the breeder, or his calculations may be upset. Last, but not least, Mendelian experiments with plants and animals have shown clearly that, as a rule, reciprocal crosses give similar results. These may serve a useful purpose in exposing once more the popular delusion that the "male parent gives the colour, while the female parent gives the form."

Many other questions of practical value are involved in Mendel's law of inheritance, but further experiments are necessary before one can venture to deal with them confidently.

REPORT ON THE METEOROLOGICAL OBSERVATIONS MADE AT THE SOCIETY'S GARDEN AT WISLEY IN 1906.

By R. H. CURTIS, F.R.Met.Soc.

THE observations at the Garden were made regularly throughout the year by Mr. T. Frazer and Mr. R. Wallis, and the instruments when examined and verified by me at the end of June were all found to be in excellent order. One of the earth thermometers subsequently became broken, but by using a substitute the observations were continued without interruption, and a reserve thermometer has now been added to the equipment of the station in view of the possibility of a similar accident occurring in the future.

January.—The weather throughout January was generally of an unsettled character, with frequent gales and strong winds; but as the prevailing winds were from the south-westward right through the month they were accompanied by mild open weather, and the temperature was everywhere above the average. Towards the close of the month there were some exceptionally warm days, with maximum temperatures in some localities considerably above 50°; but as there were no very low temperatures, the range of the thermometer was not great. Thunderstorms were experienced in some districts, and there were a few snowstorms, but none of special severity. The rainfall was above the average all over the kingdom, and in many parts of the southern counties the fall amounted to from 4 to 8 inches. But notwithstanding the heavy rainfall there was also a fair amount of sunshine over the southern half of the kingdom, the northern half being less favoured in this respect.

Observations made at Wisley:

Mean temperature of the air in shade	...	...	...	...	42°·3		
Highest	"	"	"	...	...	53°·3	on the 6th
Lowest	"	"	"	...	...	25°·1	" 24th
Lowest	"	on the grass	...	...	...	19°·5	" 23rd
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	40°·7	42°·3	43°·7
Highest	"	"	"	...	...	44°·8	45°·0
Lowest	"	"	"	...	...	36°·2	39°·6
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	88%
Rain fell on 23 days to the total depth of	...	...	...	...	...	...	3·66 ins.
(Equivalent to about 17 gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·70 in.	on the 16th
The prevailing winds were south-westerly.							
The average velocity of the wind was 8 miles per hour.							
There were 73·5 hours of bright sunshine, equal to 29 per cent. of the total possible amount, and there were only 2 entirely sunless days.							

February.—This was a stormy, unsettled month, with rather low temperature and more than the usual amount of rain, but yet remarkably bright and sunny. The winds were chiefly from some westerly

Heaviest fall on any day 0·28 in. on the 10th
 The prevailing winds were south-westerly and north-easterly.
 The average velocity of the wind was 9 miles per hour.
 There were 111·4 hours of bright sunshine, equal to 31 per cent. of the total possible amount, and there were 6 sunless days.

April.—The weather during the month was in many respects very remarkable. It was marked by an entire absence of gales of any consequence and by a great deficiency of rainfall and an excess of sunshine. The dry weather, which began in the latter part of March, continued, and in some parts of the kingdom no rain fell during four or five consecutive weeks; but the prevalence of northerly winds tended to keep the temperature low, and with the clear skies ground frosts at night were very severe. The month was therefore a cold one, and the range of temperature was very large, whilst the amount of bright sunshine was everywhere above the average.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	45°·9		
Highest	"	"	"	...	...	71°·6	on the 12th
Lowest	"	"	"	...	...	25°·0	" 15th
Lowest	"	on the grass	...	...	...	15°·1	" 15th
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	45°·4	46°·2	45°·1
Highest	"	"	"	...	...	49°·5	48°·4
Lowest	"	"	"	...	...	41°·8	42°·2
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	69%
Rain fell on 8 days to the total depth of	...	...	...	...	...	...	0·49 in.
(Equivalent to about 2½ gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·22 in.	on the 27th
The prevailing winds were from between west and north-east.							
The average velocity of the wind was 6½ miles per hour.							
There were 232·4 hours of bright sunshine, equal to 57 per cent. of the greatest possible amount. There was only 1 day on which no sunshine was recorded.							

May.—The weather of May was changeable and unsettled, and, contrary to its usual character, exceedingly dull and sunless. Over the southern half of the kingdom the drought of April continued during the first week or ten days of the month, after which there were frequent and heavy falls of rain and several thunderstorms, so that in most districts the total fall of the month exceeded the average. The winds were distributed pretty evenly round the compass, but the temperature was generally below the average, and its range was rather large.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	52°·7		
Highest	"	"	"	...	...	74°·3	on the 13th
Lowest	"	"	"	...	...	30°·2	" 18th
Lowest	"	on the grass	...	...	...	22°·0	" 18th
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	51°·8	51°·5	49°·1
Highest	"	"	"	...	...	57°·6	55°·9
Lowest	"	"	"	...	...	45°·2	46°·8
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	75%

Rain fell on 16 days to the total depth of... 1·16 in.

(Equivalent to about $5\frac{1}{2}$ gallons of water per square yard.)

Heaviest fall on any day ... 0·36 in. on the 26th

The winds were most frequently from north and north-east and from south and south-west, but winds were recorded from every point.

The average velocity of the wind was $6\frac{1}{2}$ miles per hour.

There were 151·3 hours of bright sunshine, equal to 32 per cent. of the greatest possible amount. There were 5 days on which no sunshine was recorded.

June.—This was another exceptionally bright and sunny month, the recorded amount of bright sunshine being in some parts of the kingdom as much as 86 per cent. of the possible maximum. It was warmer than the average over the northern parts of the kingdom, but notwithstanding the unusual amount of sunshine it was cooler than usual in the south-east. The rainfall was above the average over the southern half of the kingdom but below it elsewhere. This excess was, however, chiefly due to a very heavy and prolonged fall of rain at the close of the month, in which from two to two and a half inches of rain fell in about eleven hours in the south-east of England.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	57°·7		
Highest	"	"	"	...	...	80°·2	on the 23rd
Lowest	"	"	"	...	...	34°·2	" 5th
Lowest	"	on the grass	...	...	...	26°·5	" 5th
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	59°·4	58°·6	54°·9
Highest	"	"	"	...	...	65°·5	62°·8
Lowest	"	"	"	...	...	54°·7	54°·8
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)	...	...	...	...	...	...	69%
Rain fell on 8 days to the total depth of	...	...	...	...	...	...	2·16 ins.

(Equivalent to about 10 gallons of water per square yard.)

Heaviest fall on any day ... 1·26 in. on the 28th

The prevailing winds were north-easterly.

The average velocity of the wind was $4\frac{1}{4}$ miles per hour.

There were 251·1 hours of bright sunshine, equal to 51 per cent. of the greatest possible amount. There were no days on which sunshine was not recorded.

July.—This was a month of quiet, seasonable weather, with more than the average amount of sunshine and less than the normal fall of rain, but with no very high temperatures such as are often experienced in July ; indeed, in nearly all parts of the country the average temperature was below the mean for the month. Several thunderstorms were experienced in various parts of the country, and in some instances they were accompanied by somewhat heavy falls of rain.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	62°·8		
Highest	"	"	"	...	...	83°·0	on the 30th
Lowest	"	"	"	...	...	41°·2	" 1st
Lowest	"	on the grass	...	...	...	37°·0	" 21st
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	63°·9	62°·9	59°·4
Highest	"	"	"	...	...	68°·1	65°·5
Lowest	"	"	"	...	...	59°·8	60°·2

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 68%

Rain fell on 10 days to the total depth of 0.52 in.

(Equivalent to about $2\frac{1}{2}$ gallons of water per square yard.)

Heaviest fall on any day 0.15 in. on the 18th

The prevailing winds were westerly, from south-west to north-west.

The average velocity of the wind was $4\frac{1}{4}$ miles per hour.

There were 255.8 hours of bright sunshine, equal to 52 per cent. of the greatest possible amount. There were no days on which sunshine was not recorded.

August.—The weather of this month differed considerably in different parts of the kingdom. In the western and northern districts it was unsettled, and there was more than an average fall of rain; but over the Midlands and the eastern and southern counties it continued fine throughout, with a small rainfall, high temperature, and abundant sunshine. In several districts there were thunderstorms, accompanied in many instances by heavy falls of rain, and in some cases hail. One of the latter, which occurred at the beginning of the month, was exceptionally destructive to crops and to gardens in the eastern Midland districts. At the close of the month some unusually high temperatures were experienced over a considerable portion of the kingdom.

Observations at Wisley :

Mean temperature of the air in shade	...	...	...	...	64°.3
Highest	"	"	"	...	91°.1 on the 31st
Lowest	"	"	"	...	40°.7 " 29th
Lowest	"	on the grass	...	...	34°.0 " 29th

				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	64°.5	64°.5	61°.8
Highest	"	"	"	...	67°.8	66°.3
Lowest	"	"	"	...	60°.7	62°.4
						61°.1

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 70%

Rain fell on 9 days to the total depth of 1.06 in.

(Equivalent to about 5 gallons of water per square yard.)

Heaviest fall on any day 0.43 in. on the 2nd

The prevailing winds were from south, south-west, and west.

The average velocity of the wind was 6 miles per hour.

There were 237.2 hours of bright sunshine, equal to 53 per cent. of the greatest possible amount. There were no days on which sunshine was not recorded.

September.—The remarkable warmth with which the preceding month closed continued during the earlier days of September, and some very high readings of the thermometer in the shade were recorded in many places, together with equally remarkable readings of the solar radiation thermometer. This very hot spell did not last long, however, although the weather still continued warm during nearly the whole of the month, with less than the average fall of rain, and with a remarkable excess of bright sunshine. In many localities no rain at all fell throughout the latter half of the month.

Observations made at Wisley :

Mean temperature of the air in shade	...	...	...	...	57°.9
Highest	"	"	"	...	92°.2 on the 1st & 2nd
Lowest	"	"	"	...	33°.2 " 26th
Lowest	"	on the grass	...	...	26°.8 " 25th

					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	59°·8	61°·5	60°·6
Highest	"	"	"	...	67°·0	66°·1	62°·4
Lowest	"	"	"	...	52°·8	56°·3	57°·5
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)							
	...	...	...	...	...	...	77%
Rain fell on 9 days to the total depth of	...	...	...	...	...	...	1·74 in.
(Equivalent to about 8 gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·91 in.	on the 4th
The prevailing winds were from north and north-east.							
The average velocity of the wind was 4 miles per hour.							
There were 171·2 hours of bright sunshine, equal to 46 per cent. of the greatest possible amount. There was but 1 day on which no sunshine was recorded.							

October.—The settled weather of the preceding months now became broken, and was succeeded by changeable and unsettled conditions. Rain fell frequently, and in most districts the total fall exceeded the average for the month. The weather continued warm, however, for the season, although the amount of bright sunshine was in most cases below the average; but frosts were rare, and the thermometer seldom fell below 40° in the night, so that the period was one of almost uninterrupted mildness.

Mean temperature of the air in shade	...	...	...	...	53°·6		
Highest	"	"	"	...	...	68°·4	on the 1st
Lowest	"	"	"	...	...	31°·0	" 26th
Lowest	"	on the grass	...	...	...	28°·0	" 26th
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	54°·3	56°·1	56°·7
Highest	"	"	"	...	59°·1	58°·8	57°·8
Lowest	"	"	"	...	48°·4	51°·5	54°·1
Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100)							
	...	...	...	...	...	...	87%
Rain fell on 19 days to the total depth of	...	...	...	...	...	...	4·10 ins.
(Equivalent to about 19 gallons of water per square yard.)							
Heaviest fall on any day	...	...	...	...	...	0·63 in.	on the 8th
The prevailing winds were from south-west and south.							
The average velocity of the wind was 6 miles per hour.							
There were 108·5 hours of bright sunshine, equal to 33 per cent. of the greatest possible amount. There were 4 days on which no sunshine was recorded.							

November.—The weather of this month was unseasonably warm, especially towards its close, when some unusually high maxima for November were recorded. In the northern and eastern districts there was an excess of rain, but in most parts of the kingdom it still continued dry, and as a result of the warmth and moisture the leaves continued green and their fall was much delayed. Generally speaking, the amount of bright sunshine was less than the average for the month.

Mean temperature of the air in shade	...	...	...	...	46°·0		
Highest	"	"	"	...	...	60°·4	on the 22nd
Lowest	"	"	"	...	...	26°·0	" 12th
Lowest	"	on the grass	...	...	...	21°·4	" 19th
					At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	...	46°·7	48°·9	51°·0
Highest	"	"	"	...	...	49°·8	51°·6
Lowest	"	"	"	...	...	41°·7	45°·7
							49°·1

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 89%

Rain fell on 18 days to the total depth of 3.79 ins.

(Equivalent to about $17\frac{1}{2}$ gallons of water per square yard.)

Heaviest fall on any day 0.67 in. on the 8th

The prevailing winds were from south-west and west.

The average velocity of the wind was $6\frac{1}{2}$ miles per hour.

There were 41.5 hours of bright sunshine, equal to 16 per cent. of the greatest possible amount. There were 13 days on which no sunshine was recorded.

December.—The weather of the closing month of the year was somewhat variable. During the first week it was windy and wet, but continued mild. Then a cold spell succeeded, with frosts and occasional hail and snow, which in some districts fell heavily. The third week was again milder, but the closing days of the month were cold, with snow in most places, and with strong boisterous winds. The fall of rain varied in different districts, but the amount of sunshine was generally in excess of the average for the month.

Mean temperature of the air in shade	...	...	...	...	37°.4
Highest	"	"	"	...	54°·9 on the 3rd
Lowest	"	"	"	...	21°·8 " 27th
Lowest	"	on the grass	...	...	11°·5 " 28th

				At 1 ft. deep.	At 2 ft. deep.	At 4 ft. deep.
Mean temperature of the soil at 9 a.m.	...	...	...	40°·0	43°·2	46°·5
Highest	"	"	"	...	47°·2	48°·9
Lowest	"	"	"	...	36°·1	39°·3

Mean relative humidity of the air at 9 a.m. (complete saturation being represented by 100) 87%

Rain fell on 20 days to the total depth of 1.76 in.

(Equivalent to about $8\frac{1}{2}$ gallons of water per square yard.)

Heaviest fall on any day 0.30 in. on the 15th

The prevailing winds were from south-west to north-west and north.

The average velocity of the wind was $6\frac{1}{2}$ miles per hour.

There were 50.7 hours of bright sunshine, equal to 21 per cent. of the greatest possible amount. There were 13 days on which no sunshine was recorded.

The outstanding features of the year's observations made at the Garden at Wisley will be most readily seen from the following diagrams.

The upper portion of fig. 1 shows for each month the departures of the mean temperature from the average. It was only in four instances that the mean for the month fell below the average, and in no instance was the defect large, whilst in seven months, five of which were consecutive—July to November—the average was considerably exceeded.

The lower portion of the diagram exhibits in a similar way the remarkable dryness of the greater portion of the year, the deficiency of rain being continued with two unimportant exceptions from February to September.

Fig. 2 shows the variations in the mean temperature from month to month. The fall in the mean from January to February was due to the unusual warmth of the first month rather than to the cold of February; but the unusual dip in the grass temperature mean in April was caused by the sharp night frosts resulting from the clear skies, which were so marked a feature of the weather of that month from a horticultural

TEMPERATURE.

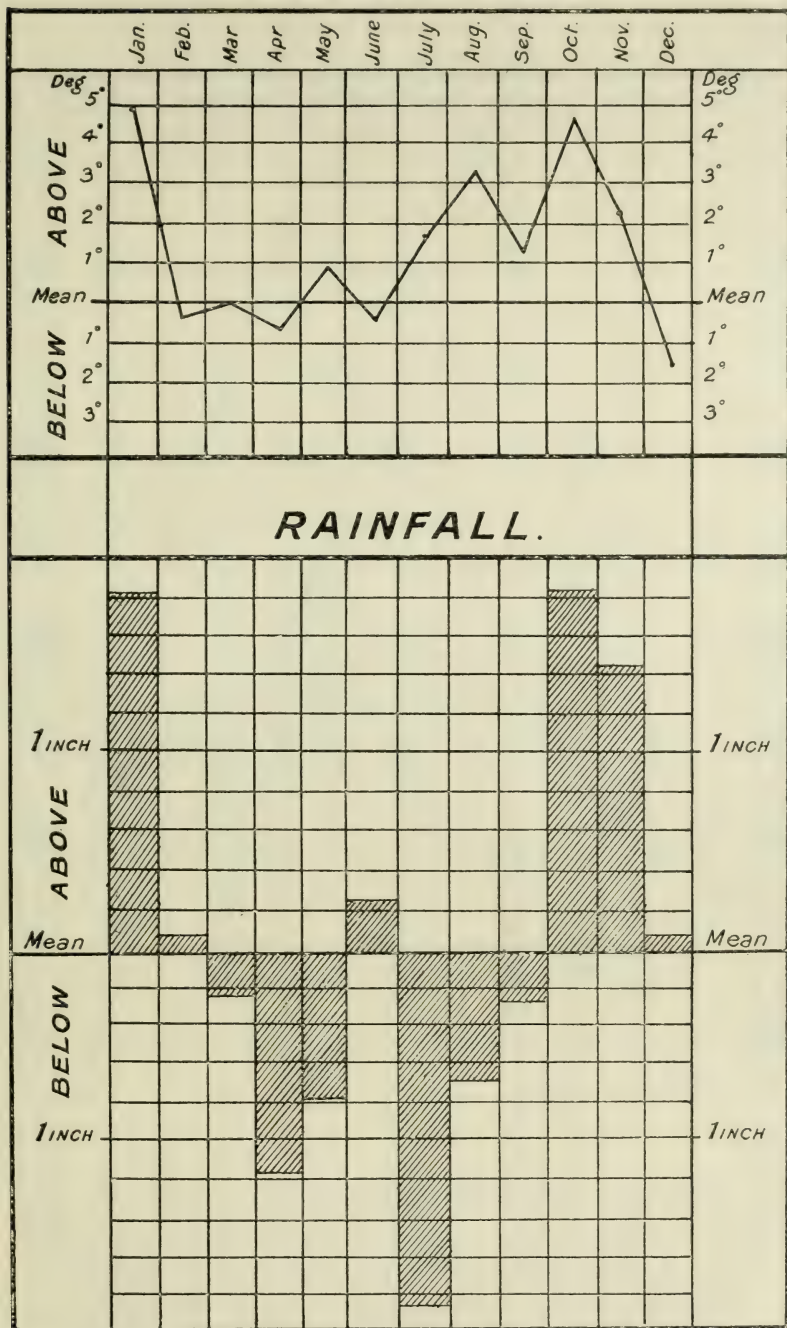


FIG. 48.—DIFFERENCE FROM THE AVERAGE OF THE MEAN MONTHLY TEMPERATURE OF THE AIR AND OF THE MONTHLY FALL OF RAIN AT WISLEY DURING THE YEAR 1906.

point of view. On the other hand the prevalence of cloud in October made night frosts rare in that month, and the result is shown in the mean temperature on the grass for October being as high as it was in September.

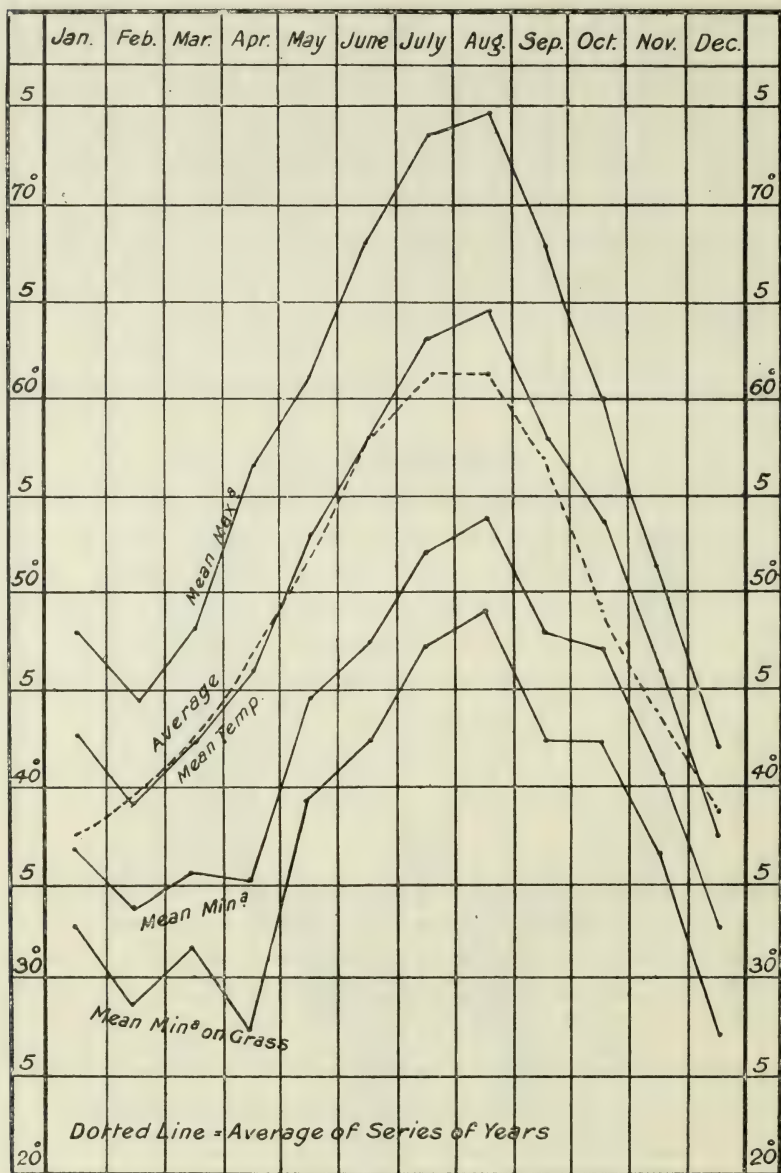


FIG. 49.—MEAN TEMPERATURE OF THE AIR FOR EACH MONTH OF THE YEAR COMPARED WITH THE AVERAGE; ALSO THE MEANS OF THE HIGHEST AND LOWEST TEMPERATURES OBTAINED EACH DAY, AND OF THE LOWEST TEMPERATURE REACHED ON THE GRASS AT WISLEY DURING THE YEAR 1906.

The comparison of the march of the temperature of the soil at different depths with the temperature of the air exhibited in fig. 3 shows a closer

agreement among all the curves than is usual, and especially in the case of the temperature at a depth of 4 feet, which usually lags more behind

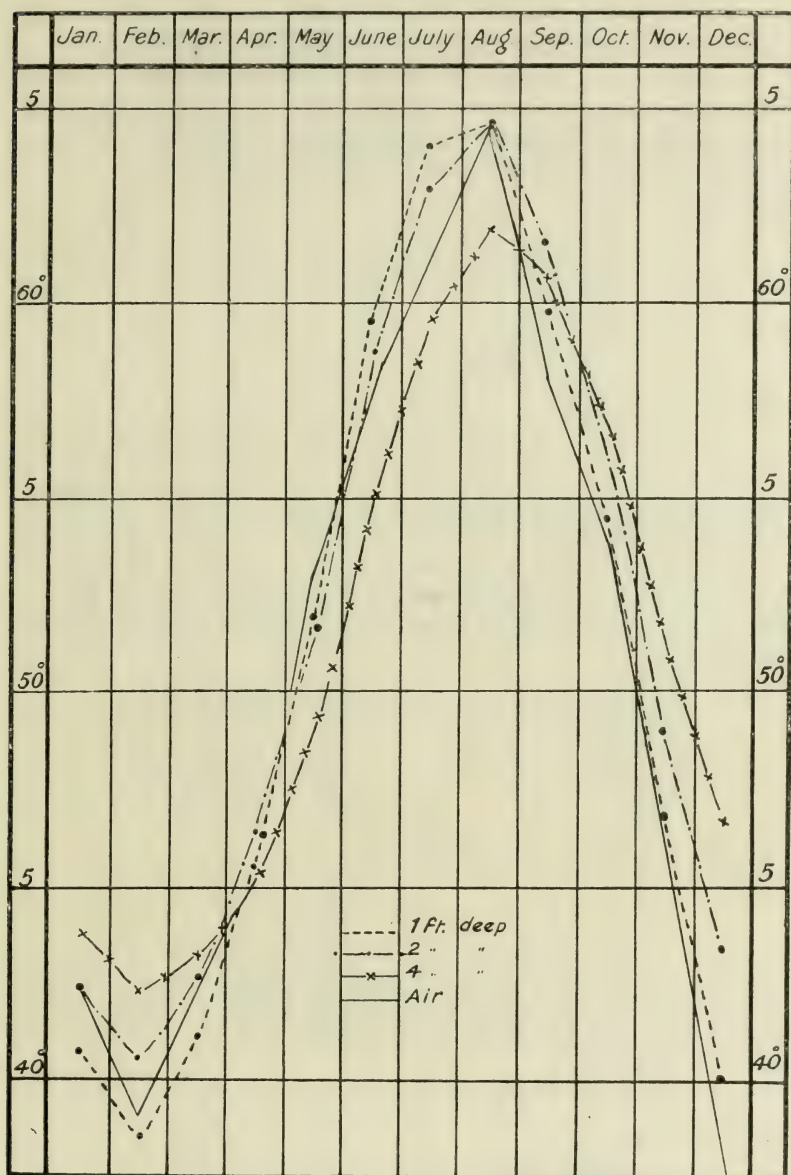


FIG. 50.—MEAN TEMPERATURE OF THE SOIL AT 9 A.M. AT A DEPTH OF 1 FOOT, 2 FEET, AND 4 FEET BELOW THE SURFACE COMPARED WITH THE MEAN TEMPERATURE OF THE AIR AT WISLEY DURING THE YEAR 1906.

the others than is the case here. This was doubtless due to the remarkably sunny character of the weather of the year, which was one of its most prominent features.

ANNUAL REPORT OF CONSULTING CHEMIST,
DR. J. A. VOELCKER, M.A., F.I.C., F.L.S.

DURING the year 1906 twenty-seven samples were submitted to me by twenty-two different Members of the Society for analysis.

The list is as follows :—

Superphosphate	1
Basic slag	1
Shoddy	2
Hop manure	1
Vine manure	3
Waste materials	2
Soils	6
Waters	11
	<hr/>
	27

The sample of superphosphate was of good quality, giving 33·07 per cent. of soluble phosphate.

The one sample of basic slag was also good: it contained 46·78 per cent. of phosphate and had a “fineness” of grinding of 88·5 per cent.

The three manures sold as “vine manure” were analysed with the following results :—

	A.	B.	C.
Soluble phosphate	17·79	15·71	12·22
Insoluble phosphate	2·71	11·51	7·88
Total nitrogen	7·85	4·37	5·67
Equal to ammonia	9·53	5·31	6·88
Potash	9·05	5·71	2·87

The prices per ton were as follows :—

A.	£13 10s.
B.	£8
C.	£13 5s.

Of these B was the only one that at all approximated in value to the prices at which the manures were respectively sold, the other two being excessively dear.

A waste material, offered at 12s. 6d. per ton, gave the following results :—

Moisture	8·10
*Organic matter	4·43
†Phosphoric acid	1·02
Lime	10·53
Oxide of iron &c.	32·19
Sand	43·73
	<hr/>
	100·00

*equal to tribasic phosphate of lime 2·22

†containing nitrogen ·08

equal to ammonia ·10

This was an excessively poor material, practically devoid of nitrogen, and containing only a little over 2 per cent. of phosphates. It was stated to be "very good for root crops and other crops deficient in phosphates, and also as a preventive against insects."

A few shillings per ton would have been its full value, and it certainly was not worth paying any carriage on.

Several interesting points were brought out in connection with the samples of soil which were forwarded for analysis. In one case a great deficiency in lime was shown, the soil containing, in the air-dried state, only 0.13 per cent. of lime.

A second sample, a red sandy loam, was found to be deficient in vegetable matter; while, in the case of a third sample, examination of it proved it to be strongly alkaline in character. Regarding this soil a complaint had been made that trees in a peach border, "suddenly collapsed," and on this account the soil was sent for analysis. On washing out the soil with water I found it to yield an alkaline liquid, and this contained relatively large amounts of nitrates and sulphate of lime. Also, the rootlets scattered through the soil were found to be covered with a crystalline mass, which proved to be sulphate of lime. The quantities of salts far exceeded anything that would be naturally found in a soil, and it was clear that some excessive treatment with materials of alkaline nature had been adopted, and so injured the trees.

It may be of interest to give the following analysis of a sample of soil obtained from near Gibraltar, the soil being one in which *Narcissus viridiflorus* especially flourishes:—

Organic matter and loss on heating	2.69
Oxide of iron and alumina	3.95
Lime . . . . .	.17
Phosphoric acid . . . . .	.04
Alkalies &c. . . . .	.66
Insoluble siliceous matter	92.49
	<hr/> 100.00
Nitrogen . . . . .	.099

It is not clear to me that there is any definite connection between any constituent of the soil (which, indeed, is one of distinctly poor character) and the luxuriance of the *Narcissus viridiflorus*, and I should consider that the cause must be sought in other directions, such as climate, situation, &c.

Eleven samples of water were sent to me for examination. Of these only three were entirely satisfactory. One was much polluted with drainage matter, and four others were of doubtful quality.

In three cases injury caused to plants was believed to be due to the water, and the samples of water were duly examined with a view of ascertaining whether this was the case. In one instance the water was found to be foul-smelling and highly charged with sulphuretted hydrogen gas. This, of course, is very prejudicial to plant life.

In a second instance it was stated that "of late everything grown in the house has gone wrong!" The water was found to be exceedingly saline in nature. It gave total solids amounting to 119 grains per

gallon, and, of this, 55·27 grains per gallon consisted of chloride of sodium. A water of such a saline character is eminently unsuitable for horticultural use.

In the third case rain-water had been used, but it was mentioned that when the water was used in spring or in summer for syringing the plants, the points of the leaves died just where the drops of water collected, but that when syringing was discontinued the leaves grew again and became healthy. This pointed to the probability of something being amiss with the water. Examination of it showed it to contain 8·68 grains per gallon of total solids, a quantity certainly in excess of that which an ordinary rain-water sample would contain.

A more striking feature, however, was that the water contained high amounts of chlorides and sulphates, and there were no less than 2·25 grains per gallon of sulphur compounds reckoned as sulphuric acid.

Inquiry as to the surrounding circumstances elicited the information that the garden where the water was used was in the near vicinity of works from which smoke and fumes proceeded. No doubt the air, and consequently the rain-water, became much charged with the products thus emitted, thereby accounting for the injury done to the plants.

EXHIBITION OF SOUTH AFRICAN FRUIT.

MARCH 22, 1906.

By the Rev. W. WILKS, M.A.

I HAVE been asked to put down on paper, not an official or formal report on the show of Cape fruit held in our Hall on March 22, 23, 24, 1906, but my own individual ideas thereupon.

First let me say, generally, that it was a most interesting and surprising exhibition, and did the utmost credit to those who had organised it and got it all together. Then I will take the several items and speak quite candidly on each, keeping back nothing that occurs to me.

FRESH FRUIT.

Apples.—Many very beautiful boxes and examples were shown—very beautiful at a first glance, but on examination many of the fruits proved “soft,” and the prevalence of the black-spot fungus was quite remarkable. Even where it was not sufficiently advanced to show through the skin, its presence could be clearly detected by the tiny pit-like depression which so often occurs over it. I cannot hold out much hope of a good market for Cape apples unless, first and foremost, the black-spot fungus be got rid of, and then firmer and crisper varieties be grown.

Pears.—These were almost, if not quite, as numerous as the apples; and for dessert pears I think there should be a great future at the Cape and a great market in England. The specimens shown were remarkable for cleanness of skin, tenderness of flesh, and absence of all defects. The size of the individual fruits left nothing to be desired. They were amply large enough without being too big and coarse, as some of our English-grown exhibition specimens very often are. But only the best varieties should be grown. The following would, I think, be the best dozen (I name them in order of ripening):—‘Williams’s Bon Chrétien,’ ‘Souvenir du Congrès,’ ‘Triomphe de Vienne,’ ‘Louise Bonne,’ ‘Beurré Hardy,’ ‘Beurré Superfin,’ ‘Doyenné du Comice,’ ‘Beurré Dumont,’ ‘Beurré d’Anjou,’ ‘Josephine de Malines,’ ‘Glou Morceau,’ ‘Easter Beurré.’ Such varieties as ‘Capiaumont’ and ‘Clairgeau’ may sell at first, but as soon as the consumers find out their comparative worthlessness the market for them is bound to fall away, and that just when the trees in the colony are coming into full bearing. Plant only the best varieties and be sure they are true to name, for the nomenclature of the pears sent to this exhibition was exceedingly faulty. Has anyone tried ‘Chaumontel’? I should think it exactly suited to the Cape, and it

would command a very long price on the English market at this time of year. There is another first-rate pear which should be tried—'Beurré d'Avalon.' In England I rank it almost if not quite equal to 'Comice,' and it might be better grown at the Cape than it is here. It is like 'Beurré Hardy' in appearance, but has a very distinct flavour of the good old 'Chaumontel.'

Plums.—These have already established a good market in this country, and are sure to maintain it notwithstanding their lack of flavour. They are very juicy and sweet, but have no trace of the rich vinous flavour of our English plums. Still if, as I am told (though it is hard to believe), our English varieties will not grow at the Cape, then the market must be content with their Japan varieties. I would suggest to some enterprising colonist to cross the Japan plum with one of our best cooking English plums, using the Japan plum as the seed-bearer, so as to impart a little acidity and flavour to the offspring whilst preserving the Japan plum's habit of growth &c. Such a plum, if it could be obtained—and I see no difficulty—would be a very valuable addition to Cape fruits.

[Since this Report was written I have made the acquaintance of the so-called 'Apple Plum.' It deserves a better name, for it is a magnificent fruit, and if it grows and bears well I advise Cape growers to go in for it heavily. If it can be put on the London market in March and April at a reasonable price, it will find a ready sale. But sixpence each (as at present) is far and away too much for any but millionaires to give, and I would remind our Cape friends that fortunes in fruit are not to be made out of millionaires in this country; they are too few and far between; it is the great middle class they should aim at reaching.]

Peaches.—A great deal is required before we can call the Cape peaches a success—if, indeed, they ever can be so; a quicker transit is what is so sorely needed for this very perishable fruit. At present the fruits are generally of a very bad colour, woolly, and of little flavour.

Nectarines.—These are better travellers than peaches, and though the fruits are small they arrive on the market in far better condition and of fairly good flavour. They would probably be improved in quality as well as size, and therefore command a higher price, if the trees were well thinned while the fruits were young. 'Lord Napier' should prove the best variety to grow, as it is of the finest flavour and it has a firm flesh and thick skin, which would be most valuable for travelling.

Grapes.—Here, I believe, the Cape has a really great opening. Those sent to the Show had most of them travelled well and were much appreciated, and would command a fair price in the market; but they would make double the money if the berries had been thinned, so as to let the sun and air in all around them. It ought also to pay anyone to grow 'Muscat of Alexandria' and 'Madresfield Court' under glass, so as to catch our London season when all home-grown grapes are over and the new ones not yet in. February, March, April, and May are months when there are practically no good grapes to be had. These months lie open for the enterprise of some Cape grower who will keep us stocked with the two varieties mentioned, and there is little risk in prophesying a fortune to the grower.

Melons.—Some large round yellow fruits were sent by Mr. Naidco, which looked very good, but I did not taste them. They were too large to find a ready market, I fancy. Some long green water-melons came from Mr. Sategan. They were too large to find a ready market, I am sure. We English like our melons small.

Onions.—These were excellent and left nothing to be desired. But is it possible to sell them at a profit against the far cheaper labour of Spain and Portugal?

DRIED FRUITS &C.

Apricots.—It was too late to have them fresh—they were shown in a dried state and *looked* most inviting—but judging only from those I have tasted from California I cannot think dried apricots are ever going to make a market. They seem to lose all flavour in the double process of drying and then stewing again.

Peaches.—These also were shown dried, and what I say of apricots I say of peaches, with this difference: the dried peaches lack the colour and appearance of the apricots, but retain a trifle more of their natural flavour.

Plums.—The dried plums were excellent. Tough skins, but that is a necessity if they are to dry well and retain their flavour, as these distinctly had. In my opinion they were quite equal to the best Californian plums and should command an equal price. But here is a point I cannot understand. We have been told over and over again that none of our English plums will grow at the Cape—only the Japan plums—but these dried plums were never made from Japanese varieties, I am quite certain. Where, then, did they come from? And if they were grown at the Cape, why not other English varieties as well? Surely it is worth the trying.

Raisins.—A large box of what we ordinarily call sultanas was shown, and very good they were, only that every single raisin had its strig attached, whereas, though strigs are not absolutely unknown among the sultanas from the Eastern Mediterranean, they are decidedly the exception. I noticed they were cleaner than the ordinary sultanas, and had it not been for the strigs I should have preferred them; but, as it was, not only would the labour of picking them out from the dried fruit be great, but nearly a quarter of the weight would be strigs, so that in a pound weight you would only get three-quarters of a pound of actual fruit.

Currants.—I cannot say any good word for these. They were very dry, flavourless, and full of pips.

Bottled Fruits and Jams.—It is an axiom in bottling fruits that the stronger-flavoured fruits turn out far better than the more delicate ones. The Japan plums, therefore, are eminently unsuitable ones for bottling or for jam—after the necessary cooking the little flavour they once had is all gone. The bottled apricots were very fine; I have never tasted better. My doubt is whether it can be possible for the Cape, with its dear labour, to compete in such things with Spain and Portugal, where the fruits grow equally well, and labour is not half the cost.

Tobacco.—I cannot believe that any of the ordinary Beer tobaccos will ever find a sale in this country—unless it be for fumigating purposes. But the Rhodesian Turkish and Virginian are equal to any I have ever

seen, and without a shadow of doubt have a wonderful future before them. The leaf shown was very extraordinary, both in quality and colour, proving, without doubt, that the soil of Rhodesia, as well as its climate, suits the Turkish and American tobaccoes exactly. A little more skill and knowledge in handling the leaf, and a wonderful business will be established.

Cotton.—Of cotton I know nothing and can say nothing, except that it *looked* as good and promising as the tobacco.

NOTES ON RECENT RESEARCH
AND
SHORT ABSTRACTS FROM CURRENT PERIODICAL
LITERATURE, BRITISH AND FOREIGN,
AFFECTING
HORTICULTURE
AND
HORTICULTURAL AND BOTANICAL SCIENCE.

JUDGING by the number of appreciative letters received, the endeavour commenced in volume xxvi. to enlarge the usefulness of the Society's Journal, by giving an abstract of current Horticultural and Botanical periodical literature, has met with success. It has certainly entailed vastly more labour than was anticipated, and should therefore make the Fellows' thanks to those who have helped in the work all the more hearty.

The Editor desires to express his most grateful thanks to all who co-operate in this work for the very large measure of success already attained, and he ventures to express the hope that they will all strictly adhere to the general order and scheme of working, as the observance of an identical *order* can alone enable the Editor to continue to cope with the work. The order agreed on was as follows :—

1. To place first the name of the plant, disease, pest, &c., being noticed ; and in this, the prominent governing or index word should always have precedence.

2. To place next the name, when given, of the author of the original article.

3. Then, the abbreviated form of the name of the journal &c. in which the original article appears, taking care to use the abbreviation which will be found on pp. 249, 250.

4. After this, a reference to the number, date, and page of the journal in question.

5. If an illustration be given, to note the fact next, as “fig.,” “tab.,” or “plate.”

6. After these preliminary necessities for making reference to the original possible for the reader, the abstract or digest should follow, ending up with the initials of the contributor affixed at the close of each Abstract or Note.

NAMES OF THOSE WHO HAVE KINDLY CONSENTED TO HELP
IN THIS WORK.

Baker, F. J., A.R.C.S., F.R.H.S.
 Boulger, Professor G. S., F.L.S., F.R.H.S.
 Bowles, E. A., M.A., F.L.S., F.E.S., F.R.H.S.
 Chapman, H., F.R.H.S.
 Chittenden, F. J., F.R.H.S.
 Cook, E. T., F.R.H.S.
 Cooke, M. C., M.A., LL.D., A.L.S., F.R.H.S., V.M.H.
 Cotton, A. D., F.L.S.
 Cox, H. G., F.R.H.S.
 Druery, C. T., V.M.H., F.L.S., F.R.H.S.
 Farmer, Professor J. B., M.A., F.R.H.S.
 Goldring, W., F.R.H.S.
 Groom, Professor Percy, M.A., D.Sc., F.L.S., F.R.H.S.
 Hartog, Professor Marcus, D.Sc., M.A., F.L.S., F.R.H.S.
 Hawes, E. F., F.R.H.S.
 Hay-Currie, C., F.R.H.S.
 Henslow, Rev. Professor Geo., M.A., F.L.S., F.R.H.S., V.M.H.
 Hodgson, M. L., F.R.H.S.
 Hooper, Cecil H., M.R.A.C., F.R.H.S.
 Houston, D., F.L.S., F.R.H.S.
 Hurst, C. C., F.L.S., F.R.H.S.
 Kent, A. H., A.L.S., F.R.H.S.
 Massee, Geo., F.L.S., F.R.H.S.
 Mawley, Ed., F.M.S., F.R.H.S.
 Moulder, Victor J., F.R.H.S.
 Nevill, R. C. R., F.R.H.S.
 Newstead, R., A.L.S., F.E.S., F.R.H.S.
 Rendle, A. B., M.A., D.Sc., F.L.S., F.R.H.S.
 Reuthe, G., F.R.H.S.
 Saunders, Geo. S., F.L.S., F.E.S., F.R.H.S.
 Scott-Elliot, G. F., M.A., B.Sc., F.L.S., F.R.H.S., F.R.G.S.
 Shea, Charles E., F.R.H.S.
 Shinn, C. H., F.R.H.S.
 Smith, William G., B.Sc., Ph.D., F.R.H.S.
 Veitch, Harry J., F.L.S., F.Z.S., F.R.H.S.
 Webster, A. D., F.R.H.S.
 Welby, F. A., F.R.H.S.
 Worsdell, W. C., F.L.S., F.R.H.S.

JOURNALS, BULLETINS, AND REPORTS

from which Abstracts are made, with the abbreviations used
for their titles.

Journals &c.	Abbreviated title.
Agricultural Gazette of New South Wales	Agr. Gaz. N.S.W.
Agricult. Journal, Cape of Good Hope	Agr. Jour. Cape G.H.
Annales Agronomiques	Ann. Ag.
Annales de la Soc. d'Hort. et d'Hist. Naturelle de l'Hérault	Ann. Soc. Hé.
Annales de la Soc. Nantaise des Amis de l'Hort.	Ann. Soc. Nant. des Amis Hort.
Annales des Sciences Naturelles	Ann. Sc. Nat.
Annales du Jard. Bot. de Buitenzorg	Ann. Jard. Bot. Buit.
Annals of Botany	Ann. Bot.
Boletim da Real Sociedade Nacional de Horticultura	Bol. R. Soc. Nac. Hort.
Boletim da Sociedade Broteriana	Bol. Soc. Brot.
Botanical Gazette	Bot. Gaz.
Botanical Magazine	Bot. Mag.
Bulletin de la Société Botanique de France	Bull. Soc. Bot. Fr.
Bulletin de la Soc. Hort. de Loiret	Bull. Soc. Hort. Loiret.
Bulletin de la Soc. Mycologique de France	Bull. Soc. Myc. Fr.
Bulletin Department of Agricult. Brisbane	Bull. Dep. Agr. Bris.
Bulletin Department of Agricult. Melbourne	Bull. Dep. Agr. Melb.
Bulletin of the Botanical Department, Jamaica	Bull. Bot. Dep. Jam.
Bulletin of Bot. Dep. Trinidad	Bull. Bot. Dep. Trin.
Bulletino della R. Società Toscana d'Orticultura	Bull. R. Soc. Tosc. Ort.
Canadian Reports, Guelph and Ontario Stations	Can. Rep. G. & O. Stat.
Centralblatt für Bacteriologie	Cent. f. Bact.
Chronique Orchidéeenne	Chron. Orch.
Comptes Rendus	Comp. Rend.
Department of Agriculture, Victoria	Dep. Agr. Vict.
Department of Agriculture Reports, New Zealand	Dep. Agr. N.Z.
Dictionnaire Iconographique des Orchidées	Dict. Icon. Orch.
Die Gartenwelt	Die Gart.
Engler's Botanische Jahrbücher	Eng. Bot. Jah.
Gardeners' Chronicle	Gard. Chron.
Gardeners' Magazine	Gard. Mag.
Gartenflora	Gartenflora.
Journal de la Société Nationale d'Horticulture de France	Jour. Soc. Nat. Hort. Fr.
Journal Dep. Agricult. Victoria	Jour. Dep. Agr. Vict.
Journal Imperial Department Agriculture, West Indies	Jour. Imp. Dep. Agr. W.I.
Journal of Botany	Jour. Bot.
Journal of Horticulture	Jour. Hort.
Journal of the Board of Agriculture	Jour. Bd. Agr.
Journal of the Linnean Society	Jour. Linn. Soc.
Journal of the Royal Agricultural Society	Jour. R.A.S.
Journal S.E. Agricultural College, Wye	Jour. S.E. Agr. Coll.
Kaiserliche Gesundheitsamte	Kais. Ges.
Le Jardin	Le Jard.
Lindenia	Lind.
Naturwiss. Zeitschrift Land und Forst	Nat. Zeit. Land-Forst.
Notizblatt des Königl. Bot. Gart. und Museums zu Berlin	Not. König. Bot. Berlin.
Orchid Review	Orch. Rev.
Proceedings of the American Pomological Society	Am. Pom. Soc.
Queensland Agricultural Journal	Qu. Agr. Journ.
Reports of the Missouri Botanical Garden	Rep. Miss. Bot. Gard.
Revue de l'Horticulture Belge	Rev. Hort. Belge.
Revue générale de Botanique	Rev. gén. Bot.
Revue Horticole	Rev. Hort.

Journals &c.	Abbreviated title.
The Garden	Garden.
Transactions Bot. Soc. Edinburgh	Trans. Bot. Soc. Edin.
Transactions of the British Mycological Soc.	Trans. Brit. Myc. Soc.
Transactions of the Massachusetts Hort. Soc.	Trans. Mass. Hort. Soc.
U.S.A. Department of Agriculture, Bulletins	U.S.A. Dep. Agr.*
U.S.A. Experimental Station Reports	U.S.A. Exp. Stn.†
U.S.A. Horticultural Societies' publications	U.S.A. Hort. Soc.†
U.S.A. State Boards of Agriculture and Horticulture	U.S.A. St. Bd.†
Wiener Illustrierte Garten-Zeitung	Wien. Ill. Gart.-Zeit.
Woburn Experiment Farm Report	Woburn.
Zeitschrift für Pflanzenkrankheiten	Zeit. f. Pflanz.

* The divisions in which the U.S.A. Government publish Bulletins will be added when necessary.

† The name of the Station or State will in each case be added in full or in its abbreviated form.

NOTES AND ABSTRACTS.

Aeration of Soil and Germination. By G. F. Stone (*U.S.A. Exp. Stn. Mass., 18th Ann. Rep.* 1906, pp. 124-125).—Two lots of lettuce-seeds in boxes have a funnel $4\frac{1}{2}$ in. in diameter, leading below the soil to a depth of $1\frac{1}{2}$ in. One funnel was daily attached to an air blower for six hours. Each box contained 1,500 seeds, and in the aerated box 1,210 plants were obtained, having a total weight at the end of a month of 152 grammes and an average weight of .1239 gramme; while in the other box, which was treated in the usual way, 977 plants were obtained, having a total weight of 83 grammes and averaging .0847 gramme, thus showing the benefit derived from a constant supply of oxygen during and after germination.—*F. J. C.*

Anemone Japonica Crispa (*Le Jardin*, vol. xx. No. 458, p. 93; March 20, 1906).—A charming variety of the common Japanese anemone, with parsley-like foliage and large pink flowers, often semi-double.

F. A. W.

Annual Flowers. By W. Irving (*Garden*, No. 1787, p. 97, February 17, 1906; and No. 1788, p. 118, February 24, 1906).—Among annual plants which can be grown from seeds each year the great diversity of form and colour is such that they play a most important part in the decoration of the garden, either in the form of masses in the flower-border, or in broken ground between shrubs that are planted widely apart. Many of them are easily grown and require little attention after the early stages of their existence, and these are amongst the more showy kinds. The effect produced by a broad stretch of such things as the Opium or Caucasian Poppies, Eschscholtzias, or Godetias in full flower is a most striking one, and when seen is a sight that is not soon forgotten. To produce the best effects many annuals require to be sown in the late autumn, when they form small plants before winter, and in the following spring are ready to push forth their flowers directly the weather is favourable. By sowing both in autumn and in the following spring it is possible to have a succession of many of the individual kinds throughout the whole season. The chief conditions required by annuals are fairly rich, well-worked soil, and ample space. Many annuals are sown far too thickly, and are not thinned out sufficiently, the result being thin, weedy-looking plants, and flowers inferior in size.—*E. T. C.*

Apple Trees, Blight Canker of. By H. H. Whetzel (*U.S.A. Exp. Stn. Cornell, Bull.* 236; Feb. 1906; 35 figs.).—A number of fungi have been recorded as causing various kinds of cankers on fruit trees, and the particular one under discussion is characterised by sunken and smooth areas of a brown colour being produced on the bark, particularly of the stems and branches of young trees just coming into bearing. No fungus

fruit bodies are to be found on the cankers, and the freshly cankered tissues are watery, not dry. A large percentage of the cankers are active but for one season, not, as in some other cankers, spreading from year to year. The effect of the disease upon the tree as the bark is killed is similar to that produced by partial or complete girdling, causing a check to the flow of food to the leaves from the roots. The foliage never fully expands, but remains undersized and curled, and of a pale-green or grey colour. As the canker advances, the leaves often die and dry up on the branches. Trees that manage to survive have scanty foliage, blossom profusely, and frequently set a heavy crop of fruit, which falls prematurely. Viscid milky drops exude from the canker on moist, cloudy days, and these drops contain large numbers of bacteria, the organisms which are the cause of the disease. These bacteria, known as *Bacillus amylovorus* (Burr.) de Toni, also swarm in the diseased tissues of the apple. The same bacillus causes the well-known "fire blight" of the pear and the "twig blight" of the apple. The trees become infected through weak shoots ("water sprouts"), to which the bacilli may be conveyed by insects, by means of the pruning-knife, through wounds or bruises on the branches caused by cultivation, gnawing animals, &c., and by other agents causing wounds. The means of treatment that promise the best results appear to be to cut out the cankers, and to swab out the wound with a weak solution of corrosive sublimate or 3 per cent. solution of copper sulphate, and, when dry, to paint over thoroughly with some heavy lead paint. Preventive measures are the avoidance of bruising the bark, destruction of dead branches and trees, cutting out and burning every trace of twig blight as soon as detected, painting the wounds, keeping the trees free from water sprouts during summer, avoidance of the excessive use of nitrogenous manures, and planting of trees with open branching habit. The disease has been destructive in the apple-growing regions of the United States, Canada, and probably England. Certain varieties appear much more susceptible to the disease than others; 'Baldwin' is particularly liable, 'Ben Davis,' 'Mann,' 'Hubbardston,' 'Fall Pippin,' 'Stark,' and 'Greening' all seem susceptible, while the most resistant appear to be 'Wolf River,' 'Talman Sweet,' 'Pewaukee,' 'Red Astrachan,' 'Tetofsky,' 'Grimes's Golden,' 'Wine Sap,' 'Fameuse.' A series of capital illustrations from photographs enhance the value of this excellent bulletin.—*F. J. C.*

Apple, Nomenclature of. By W. H. Ragan (*U.S.A. Dep. Agr. (Bur. Pl. Ind.), Bull. 56*; Jan. 1905).—A catalogue of all the varieties of apple referred to in American literature from 1804 to 1904, with notes on their place of origin, and descriptions indicating form, size, colour, texture and colour of flesh, flavour, use, season, and quality, as well as references to literature. About 360 octavo pages of small type are filled with the names and brief descriptions of varieties, each occupying a single line, and somewhere near 16,000 names are mentioned, many of which are synonymous, and these are indicated by difference in type.—*F. J. C.*

Apple Spraying.—By Chas. S. Crandall (*U.S.A. Exp. Stn. Illinois, Bull. 106*; 9 plates).—The relative merits of liquid and dust applications for the repression of injurious insects and fungi form the subject of this

bulletin, and the conclusions arrived at, after an experience of three seasons, are that the liquid sprays, viz. Bordeaux mixture against fungi, and arsenious sprays against insects, are much more effective than dust sprays. The foliage of the apple trees to which dust was applied suffered in the same manner and to the same extent as the trees which were not treated, while those that had been sprayed with liquid spray did not suffer from the attacks of fungi, but remained green and healthy throughout the season. The applications of dry insecticides were not so effective as liquid sprays when directed against insect attacks. The only advantage arising from the use of dry applications is the ease of transport.—*F. J. C.*

Arachnanthea annamensis. By "Anon." (*Gard. Chron.* No. 1011, p. 290, fig. 118; May 12, 1906).—This orchid bears a most remarkable flower. The petals and sepals resemble each other very much both in size and coloration; they are both yellowish, with irregular bands and blotches of a reddish-brown colour, and are very narrow. The flower measures, according to the figure, $5\frac{1}{2}$ inches from the tip of the upper sepal to the tip of the lower ones. The plant is a native of Annam.—*G. S. S.*

Asparagus. By Owen Thomas (*Garden*, No. 1793, p. 181, March 31, 1906; and No. 1794, p. 193, April 7, 1906).—The soil on which it naturally establishes itself is invariably light and sandy. There is an idea among amateurs and our working population that it is difficult to grow asparagus. This is unfortunate, as the asparagus is well adapted for growing in cottage gardens, and I venture to assert that, once beds are planted and well established and the culture of the plant understood, no other adjuncts of our cottage homes would give the cottager more profitable return than the asparagus beds. In France, we know, it is an immense and profitable industry. In some districts every cottage has its asparagus garden, chiefly cultivated by the wife and children, and for the produce a ready market is found, chiefly in England.—*E. T. C.*

Austrian Brier, The. By M. T. M. (*Gard. Chron.* No. 1019, p. 1; July 7, 1906).—"What is the Austrian brier, and whence did it come?" These questions the author answers in this article, and in support of his views quotes a large number of authorities, and says:—"From what has been said it seems clear that *Rosa lutea*, or the so-called Austrian brier, is of Eastern origin, and that it is not really native in any part of Europe, though met with here and there in a naturalised condition. How it received the name of 'Austrian' is a mystery, though it is easy to conjecture that it may have been introduced from the Levant into Austria and distributed thence into Flanders in the fifteenth or sixteenth century."

G. S. S.

Bacterial Diseases of Plants in Michigan. By W. G. Sackett (*U.S.A. Exp. Stn. Michigan, Bull.* 230; June 1905; 6 figs.).—The knowledge of bacterial diseases of plants is gradually extending, and in this bulletin six bacterial troubles are mentioned as prevalent in Michigan: pear blight, bacteriosis of Lima beans, black rot of cabbage, wilt of cucumber, musk-melon and squash, soft rot of sugar beet, and blight of

potato, tomato, and egg-plant. Descriptions of the diseases are given and remedial measures, where possible, suggested.—*F. J. C.*

Bag Method of Keeping Grapes (*Le Jardin*, vol. xx. No. 455, p. 36; February 5, 1906).—Grapes preserved in paper bags were able last autumn to resist a temperature of 7° C. (45° Fahr.) as registered at Thomery. The grapes thus preserved fetched 7 to 8 francs (5s. 7d. to 7s. 6d.) per kilo. (2 lb. 5 oz.), while other bunches not put into bags were worth only 4.50 to 5 francs (3s. 7d. to 4s.). The objections to this method are bulk and liability to mildew, but these will doubtless be obviated by modifying the shape and arrangement before another winter.—*F. A. W.*

Bag Method of Keeping Fruit (*Le Jardin*, vol. xx. No. 458, p. 82; March 20, 1906).—Experiments carried out upon grapes in 1905 show that when kept in bags they contain considerably more sugar and less acid than the grapes not so treated. Hence their market value is augmented. With pears the results were less satisfactory. The colour of the paper used for the bags appears to be of importance. White has generally been employed, but blue seems to be more satisfactory. Red produced no very marked results. The subject deserves more notice.

F. A. W.

Bean Forcing. By C. A. Vallejo (*U.S.A. Exp. Stn. Wisconsin, Ann. Rep.* 1904, pp. 261–270; figs.).—It is considered that lack of success in bean cultivation under glass is mostly due to want of knowledge of the best cultural methods and unwise selection of varieties. It is recommended that the beans should be planted so that they are from 20 to 36 inches apart. They need direct sunlight, and should be kept at about 50° to 60° F. at night and 70° to 75° F. in the day. Both air and soil should be kept moist. Fertilisers containing nitrogen, potash, and phosphates gave much better results than when one constituent was left out. ‘Ne Plus Ultra’ was found more productive and of better quality than the ‘Golden-eyed Wax’ beans. In order to keep down the white fly and red spider a moist atmosphere must be maintained, fumigation with tobacco being apt to harm the plants.—*F. J. C.*

Beans, Some Diseases of. By H. H. Whetzel (*U.S.A. Exp. Stn. Cornell, Bull.* 239; April 1906; 17 figs.).—Three diseases are dealt with.

(1) Bean anthracnose, caused by the fungus *Colletotrichum lindemuthianum*, affects stem, leaves, pods, and seeds of the bean. It is characterised by the appearance of rusty brown or black spots on stems, pods, or leaves, at times even on the seed-leaves just as they emerge from the soil. The veins on the lower surface of the older leaves are blackened and destroyed. Diseased seeds show reddish-brown or black spots, and are often sunken or shrivelled. Soaking the seeds in a disinfectant does not prove efficacious owing to the depth to which the fungal threads penetrate. Great care should be taken in procuring seed from a clean source. Any diseased seedlings should be removed and burnt. Spraying the plants thoroughly with Bordeaux mixture as soon as they are up, again about ten days afterwards, and again after the pods are set, has given excellent results. ‘Wax’ varieties are the most susceptible.

(2) Bean blight, caused by the bacterium *B. phaseoli*, is known by the large watery brown patches that appear on the leaves. These patches soon become dry and brittle, and the diseased leaves curl more or less and look as though they had been scorched. Affected pods also show the watery patches, and the whole pod may become soft and rotten. Rotation and spraying with Bordeaux mixture are most useful.

(3) Bean rust, caused by the fungus *Uromyces appendiculatus*, characterised by the leaves remaining green, or, if badly attacked, becoming yellowish, and having very small rusty brown or black spots upon the lower surface. This disease seldom attacks the stem, and is rarely so prevalent as to prove detrimental to the crop. All diseased plants should be burned as soon as the beans are harvested.—F. J. C.

Birch-borer, The Bronze. By M. V. Slingerland (*U.S.A. Exp. Stn. Cornell, Bull.* 234; Jan. 1906; 10 figs.).—Much havoc is being wrought among silver birches by this beetle (*Agrilus anxius* Gory). Its presence in the birches is not easily determined until it has been at work a year or more; but at times a reddish or rusty brown spot is to be seen on the bark, under which the insect is at work, and a ridge often develops over the burrow on the branches; later some of the topmost branches of the tree die, and finally the tree succumbs. The grubs feed in the sapwood, and are of a creamy-white colour, slender, flattened, and footless; they make burrows up to five feet in length within the course of a few months. They hibernate when full-fed just below the bark, and the perfect beetles appear in April or May. There is no known way of preventing this birch-borer from attacking white birches, and the only practicable and effective method yet found for checking its ravages is to promptly cut down and burn the infested trees in autumn or winter, or before May 1, so as to destroy all the hibernating insects. There is no possibility of saving a tree when once the branches at the top have begun to die. (*Agrilus betuleti* and *A. viridis* behave similarly in Europe.)—F. J. C.

Browallia speciosa major. By F. W. Gooch (*Gard. Chron.* No. 1006, p. 214; April 7, 1906).—"This *Browallia* has decided attractions over its congeners, chiefly on account of its more robust habit and its larger flowers, which are produced in great profusion." Directions as to the culture of this plant are then given.—G. S. S.

Cacti. By Ad. van de Heede (*Le Jardin*, vol. xx. No. 455, p. 40, February 5, 1906; and No. 456, p. 52, with coloured plate and 4 figs.).—Describes various kinds of *Cereus*, *Epiphyllum*, *Melocactus*, *Rhipsalis*, *Echinocactus*, *Mamillaria*, &c., with hints as to cultivation.—F. A. W.

Carnation, Origin of the Name of. By G. Henslow (*Gard. Chron.* No. 992, p. 449; December 30, 1905).—In this article the writer traces the origin of this word from *coronaria*, used by Conrad Gesner in 1561, through *coronation*, a corruption of *coronaria* and *cornation*.—G. S. S.

Chemical Substances used as Insecticides. By J. Barsacq (*Le Jardin*, vol. xx. No. 455, p. 43, 1906; see also No. 457, p. 72, and

No. 462, p. 150).—A series of articles interesting to the practical gardener, who wants to know rather more than the name of the chemicals he is applying, or wishing to apply, to his fruit trees.—*F. A. W.*

Chemical Foods in Horticulture. By A. Dautry (*Le Jardin*, vol. xx. No. 459, p. 102, April 5, 1906).—A plea for the extension to practical gardening of the experiments that are now exciting so much interest in agriculture. It is suggested that each gardener should ascertain the character of his own soil, by submitting it for laboratory analysis, and that he should further know the special needs of the various classes of plants under cultivation. A scheme for practical experiments is then sketched out. A cabbage bed, *e.g.*, may be divided into five plots, which are variously treated with nitrates, phosphates, potassium compounds, and ordinary manure, one plot being left to nature. The results are then tabulated, and the most successful treatment can be perpetuated. The writer insists on the great advantage of this method over any ready-made mixtures to be bought in the market; since it is obvious that these, like patent drugs, take no account of the particular constitution of the soil in question.—*F. A. W.*

Chemical Foods in Horticulture. By A. Dautry (*Le Jardin*, vol. xx. No. 461, p. 138, May 5, 1906).—Nitrate of soda and ammonium sulphate are the two most useful to the gardener, the former for pot-culture and all plants of rapid growth, the latter for winter cultures and plants of prolonged vegetation. Nitrate of soda is invaluable, inasmuch as it represents the truly assimilable form of nitrogen, and the author again insists strongly on the advantage of supplementing the soil of a garden by specific compounds rather than by the use of ordinary manure, or patent mixtures, in which the proportions of the chemical elements are unknown or ill-balanced.—*F. A. W.*

Chinese Cabbage (*Brassica sinensis*), Autumn Cultivation of. By Sauvageot (*Le Jardin*, vol. xx. No. 459, p. 110, April 5, 1906).—*Pé-Tsai*, or Chinese cabbage, should be sown in July, pricked out in August, and utilised in autumn. It may be eaten as a salad or boiled like cabbage. The stalks are a substitute for celery, the roots for turnips. It resists frost, and the heads weigh about 2 lb. In China they are said to attain a weight of 10 to 20 lb.—*F. A. W.*

Cider, Composition of, as Determined by Dominant Fermentation with Pure Yeasts. By W. B. Alwood, R. J. Davidson, W. A. P. Moncure (*U.S.A. Exp. Stn. Virginia, Bull.* 150; July 1904).—Gives details, experiments, and results obtained with a large number of samples of cider to which pure yeasts had been added. (Cf. *Journ. Roy. Hort. Soc.* xxxi. (1906), p. 307).—*F. J. C.*

Coccidæ, Catalogue of, recently described. By J. G. Sanders, M.A. (*U.S.A. Dep. Agr. Bur. Entom., Tech. Bull.* 12; Part I.).—Contains a list of references for all species described since the issue of Mrs. Ferrald's "Catalogue of the Coccidæ of the World" (in *Bull.* 88, *Hatch Exp. Stn. Mass., U.S.A.* March 1903). Indispensable to all workers with these important economic insects.—*F. J. C.*

Coloured Glass: Effect on Vegetation (*Le Jardin*, vol. xx. No. 462, p. 154; May 20, 1905).—Ripe fruit can be preserved for some time unspoiled under blue glass, and is also said to ripen more evenly in the same conditions. Pure deep blue light has a favourable action on swellings, as it checks excessive transpiration. It also favours the development of flowers, while red light is found to stimulate the production of the essential oils to which perfume is due, and red screens might be used in the culture of plants grown industrially for the manufacture of scents.—*F. A. W.*

Cranberry, Fungous Diseases of. By C. L. Shear (*U.S.A. Dep. Agr., Farm. Bull.* 221; 1905; 11 figs.).—The chief diseases due to the attacks of fungi upon the cranberry are known as blast, caused by a species of *Guignardia*, which attacks the fruit, causing it to shrivel up, the scald, attacking the berries and causing them to become very soft and of a light watery colour, and the rot, which is characterised by the occurrence of irregular black blotches just beneath the skin of the diseased portions. It is found that all of these can be kept in check by the use of Bordeaux mixture mixed with resin and fish-oil, provided the spraying is done thoroughly. Spraying should commence about the middle of August and be repeated at least four times at intervals of not more than fifteen days. Four barrels of spray fluid are required for an acre of cranberries. The soap for rendering the Bordeaux mixture more adhesive is prepared as follows:—

Resin	5 lb.
Potash lye (as used for washing purposes).	1 lb.
Fish-oil	1 pint
Water	5 gallons

Dissolve the resin with the oil in a large iron kettle. Allow to cool somewhat, then add the potash, slowly stirring the mixture and watching so as to avoid its boiling over. Add part of the water and continue boiling until the mixture will dissolve in cold water. This will require about an hour, when the remainder of the water should be slowly added and the whole thoroughly stirred. Strain. Add two gallons to every fifty of Bordeaux mixture.—*F. J. C.*

Cyclamen, The Persian. By W. Dyson (*Garden*, No. 1783, p. 36; January 20, 1906).—The best time for sowing seeds is November, or not later than the first week in January. The best soil for this purpose is a good loam, with one part leaf-mould and sufficient silver-sand to ensure free drainage.

When some of the seedlings are large enough for removal, transfer them to 2½-inch pots, taking great care to keep the small corm half above the soil; then place them on a shelf as near the glass as possible to prevent the plants from getting drawn, in a temperature of about 60° Fahr.

When the plants have made four or more leaves they should be ready for a larger-sized pot. Do not give them too big a pot; the middle size (3-inch) would be quite large enough, as cyclamen do not like to be over-potted. By the end of May they should be placed in cold frames.

E. T. C.

Daffodil Yellow Stripe Disease. By A. P. Goodwin, Miss Currey, and the Rev. J. Jacob (*Garden*, No. 1794, p. 197, April 7, 1906; No. 1797, p. 229, April 28, 1906; and No. 1800, p. 271, May 19, 1906).—These articles contain the opinions of expert growers upon this troublesome malady which attacks daffodils, and much useful information is imparted.

E. T. C.

Date Varieties and Date Culture in Tunis. By T. H. Kearney (*U.S.A. Dep. Agr. (Bur. Pl. Ind.), Bull.* 92; September 1906, pp. 110; 52 figs.; 10 plates).—An excellent paper, giving full details of the characteristics of the region where the dates are cultivated and the methods employed, together with outline drawings of the various varieties which are fully described, and a key given by which the varieties may be recognised.—F. J. C.

Davidia involucrata. By "Anon." (*Gard. Chron.* No. 1014, p. 346, fig. 138; June 2, 1906).—A very interesting tree belonging to the Cornel family, comparatively lately introduced into cultivation from China, and flowered for the first time in Europe by MM. de Vilmorin, who supplied the photograph from which the figure was made. It is said to be quite hardy. It is chiefly remarkable for the large cream-coloured bracts which surround the relatively inconspicuous flowers. The germination of the seeds presents some interesting features, which were described in the *Journal of the Linnean Society* (June 18, 1903, p. 556) by Mr. Hemsley.—G. S. S.

Diseases due to Physiological Causes. By G. E. Stone (*U.S.A. Exp. Stn. Mass., 17th Ann. Rep.* 1905, pp. 31-34).—Gives a useful list of diseases &c. of plants not generally regarded as caused by insects or fungi, but due to physiological causes.—F. J. C.

Drug Plant Cultivation, Progress in. By R. H. True (*U.S.A. Dep. Agr., Year Book* 1906, pp. 533-540; 3 plates).—Many drug plants are found wild in the States, and some through the rapacity of collectors are threatened with extermination. A plea is entered for the utilisation of many of those plants which have valuable properties, but are at present considered only as noxious weeds, and it is pointed out that millions of dollars are sent abroad annually to pay for drugs grown under conditions similar to those obtaining in parts of the States. The following plants are suggested as desirable subjects of experimental culture:—Golden seal (*Hydrastis canadensis* L.); cascara sagrada tree (*Rhamnus Purshiana* DC.); Seneca snakeroot (*Polygala Senega* Linn.); purple coneflower (*Brauneria [Echinacea] angustifolia* Heller); American wormseed (*Chenopodium anthelminticum* Linn.); jimson weed (*Datura Stramonium* Linn.); poke (*Phytolacca americana* Linn.); dock (*Rumex crispus* L.); burdock (*Arctium Lappa* Linn.); poppy (*Papaver somniferum* Linn.); camphor; liquorice; belladonna (*Atropa Belladonna* Linn.); foxglove (*Digitalis purpurea* Linn.); peppers.—F. J. C.

Electrical Potential, Influence of, on the Growth of Plants. By N. F. Monahan (*U.S.A. Exp. Stn. Mass., 17th Ann. Rep.* 1905 pp. 14-31).—The experiments were designed to ascertain the influence of

differences in electrical potential of the atmosphere upon the growth of plants. The plants experimented with were grown in glass cases, kept in a greenhouse, the air of which was found at no time to indicate any electrical potential. All conditions of culture were kept as nearly as possible identical in the cases, except that half the cases were charged each morning to a potential as near 150 volts as possible by means of a wire projecting into the case from a Topler-Holtz influence machine, the electrical measurements being made by a Thomson quadrant electrometer. The cases were all kept closed for four hours after charging, then opened, so that for twenty out of the twenty-four hours the plants were all under identical conditions. The result showed an average weight as follows :—

	Exp. 1.		Exp. 2.	
	Tops	Roots	Tops	Roots
Normal case	10.097	2.333	.669	.724
Electrically charged case	15.750	3.850	.995	1.072

radishes being the plants experimented with. The leaves were at times carefully measured, and it was found that in every case the width and length of the leaf-blade, and the length of the petioles of the plants electrically treated, exceeded those of the normally grown plants; although these were not increased proportionately they were also of a lighter green colour, and appeared more succulent, although moisture determinations made at the end of the experiment did not show a difference in this respect. The leaves of the electrically treated plants showed a greater tendency to leaf-burn than did the normal plants. The author considers that these experiments indicate that static charges act as more pronounced stimuli than current electricity when applied to soils. •

Another series of experiments was started to ascertain whether trees modify the electrical potential of the air in their vicinity to any extent, and it is concluded that they do, at least when in foliage, probably serving to keep the potential of the earth and air in more or less equilibrium. It appears possible, however, that all trees do not conduct electricity in the same direction. It is thought likely that the detrimental influence of large trees upon crops and vegetation generally in their vicinity is not wholly to be accounted for by the lack of sunshine and soil moisture, but is in part due to the influence of trees in conducting electricity.—*F. J. C.*

Eremuri, The. By W. J. (*Garden*, No. 1786, p. 85; February 10, 1906).—Eremuri start into growth early in the year, and the tips of the leaves as well as the flower-spikes are frequently cut back by the late spring frosts, spoiling the latter for the season. It is therefore advisable to plant them between low-growing shrubs, where they may obtain the necessary shelter, or else shelter should be provided in the shape of ashes or inverted pots until danger of frost is over. When planted between shrubs in this way, as the soil soon gets exhausted by the roots of the latter, it is necessary to replant every two or three years. This work may be performed as soon as the leaves have died down, lifting the plants carefully, removing the soil to a depth of 2 feet, then filling the holes with a mixture of good fibrous loam, leaf-mould, and sand. Plant the roots so that the crowns are about 6 inches below the surface of the ground, using plenty of sharp

sand, in order to make a bed for the crown to rest on. Plants in open prepared beds do not require lifting so often, and may be left alone for several years, with the exception of an occasional top-dressing of fresh loam and leaf-soil. Altogether there are about twenty species belonging to this genus found in Central and Western Asia, of which about ten have been introduced into cultivation. Of these all but four or five are confined to collections or botanic gardens.—*E. T. C.*

Evaporation of Water from Apple Trees during the Winter.

By E. P. Sandsten (*U.S.A. Exp. Stn. Wisconsin, Ann. Rep.* 1904, pp. 258–260).—Four eight-year-old apple trees were sawn off close to the earth and stood among the other trees of the orchard in an upright position. They were weighed weekly, and at the end of the winter (April 3) were found to have lost about 5 lb. per tree (*i.e.* from 15 to 20 per cent. of their total weight at the beginning of the winter). In the succeeding winter, which was moist and with a considerable number of cloudy days, only about 2 per cent. of the weight was lost. It is concluded that, with the exception of the peach and European and Japanese plums, which will not withstand a temperature reaching 35° to 40° below zero, winter killing is less due to low temperatures than to drying out of shoots, and so on.—*F. J. C.*

Flowering of Fruit Trees and Meteorological Data. By H. L. Price (*U.S.A. Exp. Stn. Virginia, Bull.* 155; May 1905).—The climate of Virginia is described, and charts showing temperature and rainfall for a period of twelve years are given. The mean annual temperature is 51°·5; mean maximum 63°·22 and mean minimum 40°·04; the absolute maximum 96° (above 95° on five occasions), absolute minimum –13° (below zero on thirty-four occasions). Average date of last killing frost April 25 (latest date May 13); average date of first killing frost September 30 (earliest date September 22). Average rainfall 39·41 inches. Many fruits are self-sterile, and in planting large numbers of trees it is important to intermix varieties that will cross together. It has been found that the European set fruit but rarely when pollinated by Japanese or other types of plum. It is important that the different varieties planted to ensure cross-pollination should flower at the same time. Tables are given showing the dates of flowering of a large number of various kinds of fruit trees during the past twelve years. The dates of flowering of different varieties of plums vary greatly, some flowering as early as April 8, others not till the 26th of the same month. Cherries varied between April 15 and 21, pears between April 16 and 30, apples between April 23 and May 5.—*F. J. C.*

Flowering of Trees, Conditions which Affect Time of. By E. P. Sandsten (*U.S.A. Exp. Stn. Wisconsin, Bull.* 137; April 1906).—After remarking how little is known of the conditions determining the date of flowering of fruit trees, the author shows, by means of comparative tables of temperatures and dates of flowering, that the climatic conditions obtaining during the months of July, August, and on to the end of the year preceding the flowering have a marked influence on the date at

which the flowers open; and he considers that a physiological constant, consisting of the sum of positive temperature units received during the ten months preceding flowering, can be formulated.—*F. J. C.*

Fruits, Promising New. By W. A. Taylor (*U.S.A. Dep. Agr., Year Book*, 1905, pp. 495-510; 9 plates, coloured).—A number of new fruits suitable for cultivation in U.S.A. are beautifully illustrated and fully described, with notes as to origin and indications of the districts where they are likely to prove useful. Two apples, 'Virginia Beauty' and 'Carson'; one pear, 'Crocker' (= 'Crocker Bartlett'); one peach, 'Everbearing'; four plums and damsons; one loquat, 'Eulalia'; several pecans, and an avocado, 'Trapp,' are described and figured.

F. J. C.

Garden, How to Crop a Small, Profitably. By W. H. Morton (*Garden*, No. 1800, p. 265; May 19, 1906).—November and December are the best months for this purpose, and the work should be carried out with all due reference to the weather. On frosty days the manure required for use may be wheeled on to the land, which should be deeply dug or trenched. If the land be laid up in ridges to remain during the winter, the soil becomes thoroughly friable.

Full particulars are given of rotation of crops, when to sow and plant, varieties, &c.—*E. T. C.*

Grape Berry Moth. By M. V. Slingerland (*U.S.A. Exp. Stn. Cornell, Bull.* 223; November 1904; 14 figs.).—There are three insects in America whose larvæ cause "wormy" grapes—the grape-seed insect (*Eroxysoma vitis*), the grape curculio (*Craponius inaequalis*), and the subject of the present bulletin (*Polychrosis viteana* Clemens). The moth has been confused with an insect (*Eudemis botrana*) which does similar harm in Europe, but this insect is not native in Europe. The larvæ feed on the blossoms and developing fruits of the grape, spin cocoons in the fallen leaves, and turn into pupæ therein, hibernating in this form. The moths hatch out about the beginning of June, and the young brood hatched from the eggs laid by these feed on the outside of the berries and flowers, thus affording a vulnerable point of attack. These larvæ form cocoons on the leaves and a second brood appears during July and August, and these do the major part of the damage, boring their way into the berries, and thus destroying them. The methods of attacking the pest recommended are as follows: (1) Destruction of fallen leaves; (2) bagging clusters just after fruit is set; (3) picking the infested berries in August; (4) destruction of trimmings; (5) spraying with an arsenical spray (which may be used in conjunction with Bordeaux mixture). Similar methods would doubtless be effective against the *Eudemis* in this country. The bulletin concludes with comparative notes concerning other species of *Polychrosis*, with which this may be confused, and upon the red-banded leaf-roller (*Eulia triferana*) which sometimes works with this moth.—*F. J. C.*

Grape-root Worm and Bud Gnat. By M. V. Slingerland and F. Johnson (*U.S.A. Exp. Stn. Cornell, Bull.* 224; November 1904;

5 figs.).—The grape-root worm (*Fidia viticida* Walsh) proves very destructive in many parts of the States. The fact that the mature beetle feeds on the foliage led to the use of a poison-spray as a means of lessening the pest. Arsenate of lead (4 lb. of the arsenate to 50 galls. of water) was used, and it is reported that the beetle can be effectively fought and controlled by a poison-spray.

A new enemy in the form of a small gnat (*Cecidomyia*), apparently allied to the pear-midge, was found in the blossom-buds of vines in neglected orchards. Flowers attacked never open, but become somewhat enlarged, and finally shrivel and fall when the maggot leaves them. It is not thought that this pest will prove very troublesome except in uncared-for vineyards.—*F. J. C.*

Harebells, Mountain (Leading article, *Garden*, No. 1783, p. 33; Jan. 20, 1906).—Our common English harebell, and other nearly allied kinds, thrive and flower freely, though in a very dwarf state, among grass that is frequently mown. In the rock-garden all the mountain harebells are easy of culture, and the few that may perish on the level ground in heavy soils endure long in dry crevices of rock; some of them, like *C. fragilis* and *C. garganica*, have, when planted on dry vertical faces of rock, a habit of growing equally in all directions, pressing their star-laden shoots firmly against the inequalities of the rocks, and frequently flowering and extending themselves thus for months. Erect flowering kinds, whose shoots do not spread freely in this manner, like the beautiful *C. pulla* and *C. Raineri*, are best on the more level spots or on ledges of loamy soil. A number of interesting dwarf kinds, like the Carpathian Harebell and its varieties, and *C. turbinata*, thrive in ordinary soil.

E. T. C.

Heaths, The Hardy. By J. C. (*Gard. Chron.* No. 1033, p. 255; October 13, 1906).—In this article a short account is given of these well-known and popular plants, and brief descriptions are given of nineteen species.—*G. S. S.*

Hippeastrums. By J. Douglas (*Gard. Chron.* No. 1004, p. 177; March 24, 1906).—A short history of the species and hybrids of this genus is given by Mr. Douglas, and directions as to their culture, and raising seedlings.—*G. S. S.*

Hydrellia Ranunculi (*Le Jardin*, vol. xx. No. 453, p. 3; Jan. 5, 1906).—A new larval parasite of watercress, which has entirely destroyed the crop this year in Méréville, Seine-et-Oise.—*F. A. W.*

Hydrocyanic Gas. By "Anon." (*Gard. Chron.* No. 1001, p. 141; March 3, 1906).—Full details are given in this article of the best method of making and using this gas. These directions, if properly carried out, appear to be most successful in destroying mealy bug, scale insects, thrip and green fly, and insects generally in glass houses.—*G. S. S.*

Inbreeding in Plants, Effect of. By A. D. Shamel (*U.S.A. Dep. Agr., Year Book*, 1905, pp. 377-392; 7 figs.).—The author uses the term "inbreeding" to include those cases where the flower is fertilised

by its own pollen, by pollen from another flower on the same plant, or by pollen from a closely related plant (father, mother, brother, or cousin). He points out that wheat, oats, barley, and tobacco are habitually self-fertilised, while maize and hemp are normally cross-fertilised. The object of the present paper is "to call attention to the use, as well as to the danger, of inbreeding in the production of varieties giving the maximum yield and value." A few cases of self-fertilised, cross-fertilised, and open-fertilised plants are described, and the effect of such methods of fertilisation on the vigour of constitution and the productiveness of some of the more important cultivated plants is shown. The author considers that there is great need for careful experimenting in order to ascertain exactly what effect the various degrees of inbreeding produce on the offspring, and suggests that the improvement of our crops can be most rapidly effected with permanently beneficial results by following the practice of inbreeding or crossing to the degree in which these methods of fertilisation are found to exist naturally in the kind of plant under consideration.—*F. J. C.*

Jasminum primulinum: its History and Culture. By E. H. Wilson (*Gard. Chron.* No. 1021, p. 44; July 21, 1906).—This plant was recently introduced from China by Messrs. J. Veitch & Sons. It is a native of the province of Yunnan, where it grows at an altitude of from 4,000 to 5,000 feet. The author gives a very interesting account of the attempts which have been made at various times to introduce this plant into England and of the climate &c. of the district in which it grows.

G. S. S.

Kniphofias and their Culture (*Gard. Chron.* No. 998, p. 81; February 10, 1906; and Nos. 999 and 1000).—In this series of articles on the genus *Kniphofia*, or *Tritoma*, the name by which it is perhaps more commonly known, the names of the species and varieties are given in alphabetical order, with short descriptions and notes. The best means of cultivating plants belonging to this genus are also mentioned.—*G. S. S.*

Larix leptolepis. By D. R. (*Gard. Chron.* No. 1035, fig. 118; October 27, 1906).—The Japanese larch is found to succeed very well in this country. "It grows very rapidly, and compares most favourably with the native larch when grown under the same conditions, and this is a most valuable qualification. A short time since I inspected a considerable number of young plantations on a large property in England, where I had the opportunity of seeing both species growing side by side. Both kinds had done well, but the difference in their annual growth was remarkable—that of the native species averaged eighteen to twenty-four inches and the Japanese from three to four feet. In ten years the whole of the native larches in these plantations will be completely overshadowed by their more vigorous neighbours." It appears that *L. leptolepis* withstands the salt-laden winds near the shore better than our native species.—*G. S. S.*

Larkspurs, The. By T. B. Field (*Garden*, No. 1799, p. 258; May 12, 1906).—Larkspurs may be divided into two classes, the annual and the perennial. The annual larkspurs are the crossbred descendants of

Delphinium Ajacis and *D. consolida*, and they comprise a series of very distinct forms, severally known as dwarf, rocket, branching, candelabrum, hyacinth-flowered, stock-flowered, and the ranunculus-flowered. These are all worth cultivating, but for general purposes the best are the branching, the hyacinth-flowered, and the rocket, which may be had in all colours except shades of yellow, of which the genus *Delphinium* gives no examples, unless we recognise *D. ochroleucum* as a yellow, which, properly speaking, it is not. The annual larkspurs are among the gayest flowers of their class, and the bright blue varieties are very beautiful. The larkspurs make finer spikes of flowers and last much longer when the seed is sown in autumn, and this practice provides the garden with agreeable verdure through the winter, for the plant is quite hardy, and fine clumps often appear from self-sown seeds.—*E. T. C.*

Lettuce : American Varieties of. By W. W. Tracy (*U.S.A. Dep. Agr., Bur. Pl. Ind., Bull.* 68 ; Dec. 1904 ; 27 plates).—The American Department of Agriculture has determined to study, and after a careful series of trials to publish the results, with descriptions and synonyms, the various kinds of vegetables one by one, the main idea being to apply to a horticultural subject the methods of systematic botany. Trials were conducted with 2,934 samples under 444 different varietal names, and it is considered that these are reducible to 107 varieties, the remainder of the names being merely synonyms. These are described, notes on history and culture are given, and where necessary illustrations (photographic) are given. The descriptive terms used are defined with precision, and an outline of classification intended to show the relationship of the varieties is given, together with a dichotomous key which greatly facilitates the identification of varieties.—*F. J. C.*

Lettuce "Drop" Disease. By H. J. Ramsey (*U.S.A. Exp. Stn. Wisconsin, Ann. Rep.* 1904, pp. 279-288 ; 2 figs.).—Great difficulty is experienced in growing lettuce in greenhouses owing to the presence of a fungus (*Botrytis*). The first symptom of the disease was a burning at the tip of the leaves followed by a partial drying-up of the leaf which became of a buff-brown colour. At this stage hyphæ were to be found in the tissues ; later the watery stage of decay set in and the leaves became limp and flabby and the spores of the fungus were produced in abundance. In the particular case under observation all infection seemed to come from air-borne spores, and no sclerotia were formed in the attacked plants. Burning sulphur in the house resulted in injury to the plants and did not stop the spread of the fungus. In a second case infection came from sclerotia in the soil (*Sclerotinia libertina* Fuckel), and in this attack the infection was rapidly followed by the total collapse of the plant. Cultures of the sclerotia and mycelium were made, but in no case were spores produced. It is pointed out that great care in watering is necessary, and attention must be paid to ventilation and temperature to ensure good results. The Massachusetts Experiment Station has shown that one of the most efficient methods of prevention of disease lies in the complete sterilisation of the soil to at least three inches deep.—*F. J. C.*

Lilacs. By W. J. Bean (*Garden*, No. 1799, p. 253; May 12, 1906).—Garden varieties of lilac, which now constitute one of the most beautiful groups of hardy shrubs, are derived from two species of *Syringa* only. These are the common lilac (*S. vulgaris*) and the Persian lilac (*S. persica*). It is to the former of these that the finest of the garden varieties owe their origin, although some of the hybrids between it and the Persian lilac are very delightful, notably the old Rouen lilac.—*E. T. C.*

Lime, Value of, in Soils. By J. J. Willis (*Gard. Chron.* No. 1027, p. 160; Sept. 1, 1906).—There seems to be no doubt that there is an annual loss of lime in most soils. Ordinary garden soils, which contain upwards of one per cent. of lime, are said to lose nearly nine hundredweight per acre every year. How the waste may be made good is discussed in this paper.—*G. S. S.*

Liparis chrysorrhea (*Le Jardin*, vol. xx. No. 453, p. 2; Jan. 5, 1906).—The United States Government have lately purchased 10,000 nests of this pernicious caterpillar in order, it is hoped, by introducing nests from France containing ichneumon larvæ to eradicate the pest. The parasitic ichneumon which preys upon the chrysalides does not exist in America.—*F. A. W.*

Love in a Mist (Nigella). By W. Irving (*Garden*, No. 1781, p. 8; Jan. 6, 1906).—In all there are about ten species belonging to this genus, and all found in countries bordering on the Mediterranean, with one or two in Western Asia. Of these only two are worth a place in the border, *N. damascena* and *N. hispanica*, while the rest are more botanical curiosities than ornamental flowers. They are of easy culture, and may be grown in any good garden soil. When the seed is sown in the open border in March they come into flower in July, but if required in bloom earlier in the year the seeds may be sown in the autumn, and the seedlings will usually stand the winter well.—*E. T. C.*

Manganese (*Le Jardin*, vol. xx. No. 457, p. 76; March 5, 1906).—Further experiments with manganese prove it to have a favourable action on vegetation. When two equal areas were treated with the same foods, a quantity of sulphate of manganese, equivalent to 50 kilos. per hectare, being added to one of them, it yielded $22\frac{1}{2}$ per cent. more in the total crop, 17.4 per cent. in the weight of grain than the other. The experiments might be worked out advantageously upon rose trees and fruit trees.—*F. A. W.*

Marigolds, The Marsh. By W. I. (*Garden*, No. 1800, p. 268; May 19, 1906).—Most of the members of this small family of plants greatly resemble one another in habit and flowers. They are spread all over the north temperate regions, usually growing in damp meadows and waterside places. In our native marsh marigold we possess one of the brightest and best of early-flowering bog plants, and those who are planning the formation of a bog garden will do well to make free use of this when planting. Its favourite position, where it grows most luxuriantly and produces the largest flowers, is in valley bottoms of black muddy soil on the edges of streams or often partly submerged. Under these conditions

the golden-yellow flowers are particularly attractive, and fully justify a prominent position in the bog garden. Calthas should also be employed in beautifying the edges of lakes and other ornamental waters by being planted in large groups. Once established, the plants increase freely by means of self-sown seeds, which germinate readily. Plants may also be increased by division of the root in autumn or spring. There are now six recognised species in cultivation.—*E. T. C.*

Meconopsis. By S. Mottet (*Le Jardin*, vol. xx. No. 459, 1906, pp. 100–101; 2 figs.).—A review of the different species of *Meconopsis*: *M. Cambrica*, the only European species; *M. heterophylla* from California, several varieties from the Himalayas, the recently introduced *M. integrifolia* from Thibet, which has lately attracted so much attention, and several other new species, with directions for cultivation.—*F. A. W.*

Mildew on Roses. By Douglas L. Freeland (*Garden*, No. 1795, p. 208; April 14, 1906).—I believe that the contagious nature of mildew is not so real as is generally supposed. To my mind the whole trouble lies in some obscure hereditary tendency which requires an exciting cause for its development. This hereditary taint is proved by the susceptibility of roses belonging to certain families being especially liable to be attacked.—*E. T. C.*

Okra: Culture and Uses. By W. R. Beattie (*U.S.A. Dep. Agr., Farm. Bull.* 232; 1905).—Okra (*Hibiscus esculentus* L.) has long been cultivated in South Europe, and this bulletin recommends it as a desirable addition to the vegetable garden, not only in the Southern States, but in the Northern. It is raised from seed sown in the open as soon as the soil is warm enough. A good and rich loam is the best soil in which to grow the crop. The pods are used (gathered the day after the flower fades) in making soups, "gumbo," salad, or they may be boiled or baked. Various recipes are given. A description of varieties follows. A note is added that a taste for the okra flavour has to be acquired by some persons.

F. J. C.

Onion Culture. By F. Garcia (*U.S.A. Exp. Stn. New Mexico, Bull.* 52; Sept. 1904; 10 figs.).—Describes the field culture of onions of the Spanish type. The soil has to be irrigated, and it is recommended that the seed should be drilled on the sides of the ridges and irrigated in the furrows. Autumn sowing gives the best results, and thinning early in the spring should be resorted to. It is better, however, to sow the seed in special seed beds either in the open or under glass and transplant in the spring. The preparation of the ground, the transplanting, irrigation, cultivation, harvesting, and storing are all described, and a table showing the cost of production is given. The various varieties grown in the district are commented upon, and notes upon the insect and fungal pests and manures suitable for the crop are added.—*F. J. C.*

Osmunda palustris var. **Mayii.** By C. T. D. (*Gard. Chron.* No. 1027, p. 161; fig. 65; September 1, 1906).—A very curious variety, originating in the nursery of Mr. H. B. May. "As will be seen by the

illustration, the normal type of the species is replaced by a peculiar 'ramo-cristate' form of the pinnæ, while the pinnules are contracted and crispate, the result being a very novel form of cresting or tasselling."

G. S. S.

Peas, Garden (Leading article in *Garden*, No. 1789, p. 129; March 3, 1906).—There are few vegetables which differ so much constitutionally as the various varieties of peas, and those only should be grown to any extent which by experience have proved to be best suited for one's own district. Exceptions, however, can be made even with these, as there are one or two standard varieties that seldom fail, and warrant inclusion in every collection.

As is generally known, the garden pea requires a well-drained, deeply trenched, and enriched soil, especially so for late summer and autumn supplies. The ground should have been well manured and deeply tilled during the winter or early spring months, and the seeds should be sown in drills thinly, allowing a good distance between the rows until the first week in April; after that time the method of sowing them in well-prepared trenches, excavated and filled in much the same way as for celery, cannot be too strongly recommended.—E. T. C.

Pine-destroying Beetle, Western. By J. L. Webb (U.S.A. Dep. Agr. (Bur. Ent.), *Bull.* 58, Pt. II.; August 1906; 2 plates, 5 figs.).—The beetle, *Dendroctonus brevicornis* Lec., a stout brownish insect about $\frac{1}{8}$ to $\frac{3}{16}$ in. long, attacks living "sugar" and "western" pines (*Pinus Lambertiana* and *P. ponderosa*) in swarms, burrowing into the living bark, in the inner part of which the female excavates winding galleries in which to deposit her eggs. This interferes with the natural flow of sap, and ultimately kills the tree. Their presence is known by the appearance of small masses of resin in the crevices of the bark of recently attacked living trees as well as of the dead and dying ones, and the beetles may be found in their characteristic galleries by removing the bark. The attack is sometimes preceded by defoliation of the trees by caterpillars, but apparently not always. The areas infected should be ascertained in September and October, and after that the infested trees should be felled and the bark removed and burned, completing this operation by May. The patches of trees worst attacked should receive the first attention. Summer cutting is undesirable, since the presence of a few felled trees attracts large numbers of insects from a distance. Trap trees may be provided so long as the bark is removed and burned before the beetles emerge. Storm-felled and lightning-struck trees should be watched, and if attacked should be treated as recommended above.

F. J. C.

Plant Food Constituents used by Bearing Fruit Trees. By L. L. Van Slyke, O. M. Taylor, and W. H. Andrews (U.S.A. Exp. Stn. New York, *Bull.* 265; April 1905).—The quantities of mineral matter taken up per acre during a year were ascertained in the case of apples, peaches, pears, plums, and quinces by carefully gathering, weighing, drying, and analysing the fruit, leaves, and new growth of wood as represented by the tips of the branches. No account was taken of that used in the increase

of wood in the stem or in the formation of new roots. Peaches used the greatest amount per acre, apples and quinces followed, while plums and pears came third. The proportions in which the various constituents were used varied little and were as follows: 1 lb. of nitrogen, .27 lb. phosphoric acid, 1.14 lb. potash, 1.35 lb. lime, and .45 lb. magnesia. The relative amounts of these constituents in the different parts of the trees naturally vary very greatly, and tables are given showing this. The amounts of food used per acre by the trees on the basis of the present experiment, the trees being of average size, will be as shown in the following table:—

Kind	No. of trees per acre	Nitrogen	Phosphoric acid (P_2O_5)	Potash (K_2O)	Lime (CaO)	Magnesia (MgO)
		lb.	lb.	lb.	lb.	lb.
Apple . .	35	51.5	14.0	55.0	57.0	23.0
Peach . .	120	74.5	18.0	72.0	114.0	35.0
Pear . .	120	29.5	7.0	33.0	38.0	11.0
Plum . .	120	29.5	8.5	38.0	41.0	13.0
Quince . .	240	45.5	15.5	57.0	65.5	19.0

F. J. C.

Plants in pans, Alpine. By H. Raphoe (*Garden*, No. 1784, p. 56; January 27, 1906).—Although not everyone has it within his means and scope to lay out a rock-garden on a large scale, with stones by the truckload, and shrubs and plants in thousands, yet anyone who has a little corner of sunny ground may grow many charming alpiners; and even if one has no garden, properly speaking, there may still remain the possibility of growing these delightful plants in pans. In some respects, indeed, the pictorial value of alpiners is greatly enhanced by their being grown in this manner; partly because, properly treated, certain kinds seem to flourish better thus than in the open rockery; but principally, perhaps, because one can then so easily have them placed for observation just under the eye. For the lover of flowers, who is infirm or an invalid, such a consideration may be a very important one.—E. T. C.

Plant Medication (*Le Jardin*, vol. xx. No. 453, p. 8; January 5, 1906).—An interesting account of extra-radical nutrition and vegetable therapeutics. In 1899 M. Bréal pointed out that various substances might be administered to plants by way of absorption through the trunk, and the subject has since been worked out by M. Mokrjetsky, who finds that salts introduced beneath the bark are quite as effective as the injection of solutions. The course of the drug in the sap can be followed by the aid of any ordinary colouring matter, and is found to run upwards in a spiral course, and downwards from the point of insertion. A chlorotic pear tree was dosed with four grammes of pyrophosphate of iron and soda, introduced through a hole in the trunk. It was found that only the branches on the same side as the hole benefited by the treatment, and the foliage became of a dark green, while on the opposite side the leaves remained chlorotic. Further, while the diseased branches were shortly afterwards attacked by the fungus *Septoria Pyri*, the medicated branches showed no trace of it, proving that the injection served to increase nutrition and resistance to disease.

The bacteria that produce gum diseases in stone-fruits can be combated by the same means. The practical gardener scrapes off the gummy exudation and applies sorrel leaves to the wound. The oxalic acid expressed from the leaves acts as an antiseptic and destroys the bacteria. But it is possible to produce immunity by extra-radical treatment, such as the introduction of very weak solutions of creasote or organic acids. In like manner the bark can be rendered immune from, and actually antagonistic to, the attacks of insects. The remainder of the article treats of spraying, which induces increased absorption as well as transpiration. The author suggests that the liquids used in this manner to destroy pests might be compounded so as to serve the double purpose of food and insecticide; if, for example, potash were employed, instead of soda, in the well-known spray of copper sulphate, sodium carbonate, and water.—*F. A. W.*

Plaster (Sulphate of Lime) as a Dressing for Fruit Trees. By Jean Béziat (*Le Jardin*, vol. xx. No. 454, p. 23; January 20, 1906).—Acts as a valuable intermediary in the absorption of potash from the soil. The sulphate of lime reacts with the potassium carbonate of the soil, forming soluble potassium sulphate, which is readily absorbed by the roots. Fifteen to twenty kilogrammes should be spread per acre (between one and two quarters per acre) in February and March, and ploughed in.

F. A. W.

Poisonous Haricot Beans. By Hortulus (*Le Jardin*, vol. xx. No. 458, p. 84; March 20, 1906; with several figures).—The consumption of haricot beans from *Phaseolus luteatus* induces symptoms of poisoning from prussic acid, due presumably to the action of the ferment emulsin upon the glucoside amygdalin in presence of water. No trace of prussic acid is discoverable in species indigenous to Europe; exotic novelties should accordingly be avoided.—*F. A. W.*

Potato, Origin of the. By P. Hariot (*Le Jardin*, vol. xx. No. 454, p. 21; January 20, 1906).—*Solanum tuberosum* appears to be a hybrid form derived from the two species *S. Commersoni* and *S. Maglia*.

F. A. W.

Potatoes, Quality in. By J. W. Gilmore (*U.S.A. Exp. Stn. Cornell, Bull.* 230; June 1905; 13 figs.).—The author concludes that the culinary and dietetic values of potatoes are "not dependent upon chemical composition so much as upon the anatomical (and perhaps physiological) characteristics of the tuber and the arrangement and distribution of starch and water areas in its substance. The structural characteristics of the tuber are influenced by the conditions of the soil" and the atmospheric conditions under which the potatoes grow. He considers that the daily range of soil and atmospheric temperature during the growing period, the degree of ripeness of the tuber when the plant dies, and the physical condition and type of soil all influence the mealiness of the potato when boiled, and to a considerable extent the flavour. In the summary it is recommended that the sets should be planted five or six inches deep. If planted deeper the moisture and temperature conditions are unsuitable for the development of tubers on

the first one or two nodes of the stem, the tubers produced are under size, immature, and somewhat prone to scabbiness. If planted shallower than three inches, the variation in temperature and moisture is too great for proper development, the tubers are crowded, and there is a large proportion of small, compound, exposed, and scabby tubers, and a tendency to produce tubers on the stalk. Those tubers which grow between the depths of one and a half and four inches are of more uniformly good quality in appearance and cooking, and of better size and development, than those growing deeper or shallower. Long tubers which grow sloping in the ground show a difference between the bud end and the stem end; the latter cooks more mealy and in most cases is more netted, while the bud end has a smooth surface. It is believed that good quality is developed under a uniform soil temperature of 65° to 75°, and that great fluctuation in temperature, such as those tubers growing above the one and a half inch level are more or less subject to, is detrimental to the best development of the tubers, while a temperature uniformly below 65° is not conducive to the best development and ripening of the tubers.—*F. J. C.*

Potatoes, Rotting, due to *Phytophthora infestans*. By C. D. Woods (*U.S.A. Exp. Stn. Maine, Ann. Rep. 1905*, pp. 1-5).—It is concluded, as the result of experiments detailed in this report, that the infection of potato tubers occurs chiefly, if not entirely, in the field before digging, and is usually the result of diseased haulm, the disease being transmitted in the majority of cases, not directly through the haulm, but indirectly through the soil. Potatoes may be infected directly in the field from spores introduced in the manure, or from rotten potatoes spread or left in the land the preceding year. Whether the plants have or have not been protected with Bordeaux mixture there is far less liability of loss from rotting in the cellar in the case of late-dug potatoes.—*F. J. C.*

Potato Spraying with Bordeaux Mixtures. By C. D. Woods (*U.S.A. Exp. Stn. Maine, Ann. Rep. 1905*, pp. 6-12).—Trials with dry against liquid Bordeaux mixture of ordinary strength yielded results greatly in favour of the latter, and the same occurred when ordinary Bordeaux mixture was tried against Bordeaux mixture + sugar, the addition of which renders the copper hydrate soluble. The yield, when sprayed with ordinary Bordeaux mixture in the latter experiment, was in one case 103 barrels and 120 barrels on two plots, as against 102 barrels, 97 barrels, and 91 barrels on three plots; in another instance 175 bushels per acre against 118 bushels per acre. The cost of making the soluble Bordeaux mixture is heavier, and the labour involved greater.—*F. J. C.*

Potatoes, Spraying, for Prevention of Leaf Blight and Blotch. By E. P. Sandsten and J. G. Milward (*U.S.A. Exp. Stn. Wisconsin, Bull. 135*; April 1906; 7 figs.).—The early blight, caused by *Macrosporium solani*, and the late blight, caused by *Phytophthora infestans*, are prevalent in most seasons in Wisconsin as in this country. The present bulletin gives the result of experiments in several districts in spraying potatoes with Bordeaux mixture. In nearly every case the

crop was greatly increased, and generally the greater the number of sprayings (up to five were given) the better the result; the expense was more than repaid by the increase in yield. The writers do not consider that the Bordeaux mixture is the direct cause of the increased yield, but that it acts only by keeping the foliage free from disease, and therefore green longer. This view is somewhat in opposition to the statement frequently made, viz. that an increased yield results from the use of Bordeaux mixture, whether "blight" is present or not.—*F. J. C.*

Primula obconica grandiflora robusta (*Le Jardin*, vol. xx. No. 453, p. 12; figure; January 5, 1906).—MM. Rivoire have recently introduced a giant variety of this plant, which they first brought out in France in 1888. The flowers are nearly five centimetres (2 inches) in diameter.—*F. A. W.*

Primulas of China, The. By E. H. Wilson (*Gard. Chron.* No. 1029, p. 191, figs. 78–80; Sept. 15, 1906; No. 1030, p. 206, figs. 85–87; No. 1031, p. 230, figs. 95, 96; and No. 1032, fig. 102).—This very interesting article on the Chinese Primulas gives an account of the habitats and the methods of growth of this favourite group of plants. The writer says:—"With 129 out of the 210 species recorded in Pax and Knuth's monograph it will at once be seen that the headquarters of the genus is to be found in the wild and rugged regions of the Indian and Chinese Alps." It is a common belief that the floras of China and Japan are one and the same, which Mr. Wilson denies, giving as a proof that "no species of *Primula* is common to China Proper and Japan." Short descriptions are given of many of the species.—*G. S. S.*

Protein Composition of Crops, Influence of Soil on the. By A. R. Whitson and C. W. Stoddart (*U.S.A. Exp. Stn. Wisconsin, Ann. Rep.* 1904, pp. 193–199).—Experiments were carried out both in the greenhouse and in the field upon maize, rape, and sorghum in order to discover what influence the amount of available nitrogen in the soil exerted upon the amount of protein in the plants growing thereon. The conclusion arrived at is that "the relative amount of protein in the plant is subject to very marked variations, dependent on the conditions under which it is grown. The fertility of the soil is undoubtedly one of the important conditions in respect to nitrates especially, but also in all probability in respect to availability of the other essential elements." . . . "It also appears likely that closeness of planting is an important factor; the more space the plant has to develop in, the greater is the ratio of leaves to stalk, and hence the greater the amount of protein it contains." *F. J. C.*

Pruning Fruit Trees. By W. Paddock (*U.S.A. Exp. Stn. Colorado, Bull.* 106; 30 figs.; 2 plates).—Intended for local use, and gives clear instructions as to the kind of pruning required by young trees, protection of trunk from various injuries by cattle, sun, &c.—*F. J. C.*

Pruning Trees and Shrubs. By W. J. Bean (*Gard. Chron.* No. 1007, p. 226, fig. 89; April 14, 1906; and No. 1008, p. 244,

figs. 95-99; April 21, 1906).—"The art of pruning," the author says, "may be said to serve one or more of the following purposes:—To improve or alter the shape or appearance of the plant; to increase the quantity and improve the quality of the blossom; to bring about an improvement in health. Of all the arts which are employed in horticulture, pruning is the one most frequently misapplied. Bad pruning is worse than none." He then gives details of how and when, according to the kind of plant, this operation should be performed. Good figures are given of the right and wrong ways of cutting off boughs of trees.

G. S. S.

Radium (*Le Jardin*, vol. xx. No. 457, p. 65; March 5, 1906).—Radium, as experimentally studied by Dr. Gayer, appears to have a deleterious effect on seeds. Where its action preponderates, germination may be retarded, and even completely arrested. Other radio-active substances, such as radio-tellurium, give similar results, while polonium appears to have no distinct action.—*F. A. W.*

Rhodora canadensis. By Jean Béziat (*Le Jardin*, vol. xx. No. 456, p. 57, fig.; February 20, 1906).—A charming shrub of Canadian origin belonging to the *Ericaceæ*. It grows between three and four feet in height, and is covered with a profusion of red rose-scented flowers. It is perfectly hardy and more ornamental than *Daphne mezereum*, with which it is comparable.—*F. A. W.*

Rhubarb, Ether Forcing of (*U.S.A. Dep. Agr., Farm. Bull.* 233; 1905).—The application of ether vapour to rhubarb in a dormant state resulted in the total yield being increased from 5 to 34 per cent., while, with one exception, the early yield was very greatly in excess over the untreated plants. The exception was when the etherisation was delayed until the beginning of February.—*F. J. C.*

Roots of Plants. By A. M. Ten Eyck (*U.S.A. Exp. Stn. Kansas, Bull.* 127; June 1904; 26 figs.).—The author has investigated the extent of the root systems of plants, and gives photographic reproductions of the root systems of several farm and garden plants, with a description of the method of investigation.—*F. J. C.*

Rose-growing in Pots. By P. (*Garden*, No. 1788, p. 116; February 24, 1906).—If purchased in 5-inch or 6-inch pots, the plants should be transferred at once to a size larger. Make up a mixture of loam, which can be obtained from a meadow, just beneath the grass. Three parts of this and one part of well-rotted manure make good rose soil if well mixed together. Have the new pots ready washed, and place in each some crocks, one large piece over the hole, and a few other smaller pieces. Put a handful or so of soil on the crocks, then the plant, having first removed the old crocks. The ball of earth should be lightly prodded with a pointed stick to release the roots a little. Press the new soil firmly around the ball, and ram it tight with a stick. If plants in 7-inch or 8-inch pots are procured, no repotting will be necessary the first year. Never have the pots over-large: that is to say, when repotting is necessary

let the pot be only one size larger each time. Do not repot roses in the winter months, but rather give them a top-dressing if they seem at all weak.—*E. T. C.*

Roses, Lifting. By Lewis S. Pawle (*Garden*, No. 1781, p. 7; January 6, 1906).—"My roses don't do well" is a remark often made to me by many of my friends, although they have an ideal spot in which to grow them. The reason, I find in a great many cases, is that the trees in the first instance were badly planted, they are left in the same place year after year, and in the autumn they receive a heavy mulching of wet, cold, sticky manure round the roots, which turns the ground sour after several applications, and deadly cold as well, half the summer having gone before the soil gets warm again. I went the other day to see a friend's roses recently planted; there they were, smothered with the nastiest, rankest, coldest manure I have ever seen, and inches thick into the bargain. It made me quite shudder to look at the poor things. No wonder they "don't do." I am a great advocate for lifting roses, and putting the manure underneath them instead of on top. I am quite sure if this were more frequently done better results would follow. Every few years roses should, in my opinion, be lifted, the beds thoroughly dug at least two spits deep, and the manure put well below the surface.—*E. T. C.*

Roses, Moss. By P. (*Garden*, No. 1787, p. 100; February 17, 1906). It seems strange that such an interesting group of bush roses should receive so little consideration. It cannot be that they are not valued, because a common expression one hears at the exhibitions is "Where are the Moss Roses? Are they not grown now?" The fact is, the craze for perpetual-flowering roses and the great advance in the hybrid teas have to some extent crowded out the moss and other beautiful roses. For their association alone there should be a bed or border of moss roses in every garden. The plants should be on their own roots—that is, raised from layers, a mode of propagation which admirably suits them. A few of the freer-blooming sorts do well as standards or half standards, but the majority should be grown in bush form.

Moss roses pay for rich culture: that is to say, well-tilled ground and manure freely applied. An open spot is essential, for if treated as shrubbery roses green fly and other pests are troublesome.—*E. T. C.*

Roses, Pruning (Leading article in *Garden*, No. 1791, p. 158; March 17, 1906).—A valuable and practical article, enumerating some hundreds of varieties, and giving directions as to pruning them.—*E. T. C.*

Roses, Pruning, The A B C of. By Edward Mawley (*Garden*, No. 1792, p. 169; March 24, 1906).—In order to give the beginner greater confidence in the recuperative power of well-planted roses than he usually possesses, and make him less afraid of damaging his plants by following even the very moderate system of pruning I am about to advocate, I may state that, were a bed of such roses mown down level with the ground in the spring, a very large majority of the plants would produce a good crop of beautiful blooms during the following summer and autumn. In fact,

I venture to say the results would be superior to those which would follow the efforts of the novice if left entirely to his own devices to deal with a similar bed.—*E. T. C.*

Roses, Pruning Neglected. By P. (*Garden*, No. 1798, p. 245; May 5, 1906).—There are practically four divisions into which neglected roses can be divided, namely: (*a*) dwarfs or bushes; (*b*) pillar roses; (*c*) standard roses; and (*d*) ramblers and climbers.

Taking the bushes first, I would advise that all shoots or growths more than one year old be cut quite down to the ground. The remaining growths would probably be one or two that are soft and pithy, and perhaps one that is well ripened and that was produced early last season. Cut down the pithy shoots, *i.e.* those having more pith than solid wood, and leave the hard growth or growths from six inches to nine inches long. The plants, if healthy, will throw up quite a number of new shoots, which should be well thinned, preserving only three or four of the best, which are allowed to grow unchecked until autumn.

In the case of Tea, Monthly, and Polyantha or Fairy roses, these may be cut down to the ground, and would be all the better for it.—*E. T. C.*

Rose Rust (*Le Jardin*, vol. xx. No. 453, p. 13; January 5, 1906).—The bitter juice secreted by the wild lettuce (*Lactuca virosa*) is said to be an excellent remedy if rubbed on the diseased parts, the leaves having been crushed in the fingers. The treatment should be repeated for several days. The plant may also be sprayed with an emulsion of the juice and water, or the mixture can be applied to the parts affected with a brush.

F. A. W.

Samshu (a Chinese Spirit) from Sorghum vulgare. By E. H. Wilson (*Gard. Chron.* No. 1005, p. 194; March 31, 1906).—The author says:—"This industry is largely carried on in North China and Manchuria, and in a lesser degree all over China." The process of manufacture is then described. The ferment is made by mixing together three parts of barley to one of peas, grinding them together, and then adding enough water to bring the mass to the consistency of putty, which is then pressed into brick-shaped moulds. The bricks are then piled up in a room to a height of four or five feet, with spaces for the free passage of air. Fungoid growth soon appears and gradually permeates the whole mass. The culture is completed in about forty days. When properly dried and stored these ferment-bricks retain their active properties for four or five years.—*G. S. S.*

San José Scale, Comparative Experiments with Various Insecticides for the. By S. A. Forbes (*U.S.A. Exp. Stn. Illinois, Bull.* 107; April 1906).—A considerable number of insecticides were tested, and the cheapest and most efficient was found to be the lime-and-sulphur spray dissolved by boiling together; the next was the lime-sulphur salt-wash so frequently referred to in these abstracts.—*F. J. C.*

Scale, Cottony Grass (*Eriopeltis festucae* Fonse). By Edith M. Patch (*U.S.A. Exp. Stn. Maine, Ann. Rep.* 1905, pp. 169-180;

2 plates).—This insect is not often present in such numbers as to prove of economic importance, being usually kept in check by the weather, the damage to the food-plants by rust, overcrowding, predaceous insects, and parasites. When the infestation, which is most obvious in autumn on account of the large white woolly ovisacs formed by the female scale, is considerable, the result of the attack is seen in the patches of dead grasses scattered through the meadows. The grasses most affected are *Poa pratensis* ("June grass") and *Agrostis alba* ("red top"). The best remedial measure appears to be to burn the field over in the spring before the eggs hatch out, and so destroy the whole generation.—*F. J. C.*

Seeds, Longevity of (Leading article in *Gard. Chron.* No. 1039, p. 349; Nov. 24, 1906).—M. Becquerel has recently been making experiments which carry on the work done by A. de Candolle on this subject many years ago. Nearly 550 species belonging to thirty of the most important families of monocotyledons and dicotyledons, the seeds of which had been gathered from twenty-five to 135 years previously. "The only seeds which have been proved to preserve their germinating power for more than eighty years are those of *Acacia biapularis*, *Cytisus biflorus*, and *Leucana leucocephala*, which are protected by a thick skin and possess reserves little subject to oxidation."—*G. S. S.*

Selection, Importance of, in Vegetative Reproduction. By W. R. Buttenshaw (*Bull. Bot. Dep. Trin.* No. 48, p. 248; October 1905).—Instances of improvement in flowering in violets, freedom from disease in pineapple, reduction of thorns in oranges, and increase of sucrose in sugar-cane from careful selection in choice of plants for propagation.—*E. A. B.*

Senecio Veitchianus. By "Anon." (*Gard. Chron.* No. 992, p. 455, Supp. fig.; December 30, 1905).—This bold and handsome groundsel was found by Mr. E. H. Wilson in the highlands of Central and Western China, at an elevation of from 4,000 feet to 8,000 feet, in moist and marshy places. The flower stems are from 3 feet to 6 feet high; the blossoms, which are of a bright yellow colour, are $2\frac{1}{2}$ inches in diameter and borne on a nearly cylindrical raceme, often more than $2\frac{1}{2}$ feet long. It seeds freely, and will quickly establish itself if plenty of room and moisture be given it.—*G. S. S.*

Sodium Salts, Plant Peculiarities as shown by the Influence of. By H. J. Wheeler (*U.S.A. Exp. Stn. Rhode I., Bull.* 104, February 1905).—A detailed account of experiments with various plants to show the effects of sodium salts with and without potash, and in some cases with lime. As a summary the writer says:—"The verdict against the equality of soda (and potash) in plant-production, returned in this experiment by the plants themselves, ought to remove any further doubt. It cannot be disputed, however, that soda is of certain use in some manner with many varieties of plants *when the supply of potash is quite limited*, and also with at least a few varieties of plants even in the presence of a fairly abundant supply of potash. It may be stated that sodium salts seem to liberate at least phosphoric acid and potash, so

that they may act as indirect manures." The foregoing statements have been usually accepted as facts for some time, but we are now informed that sodium salts "appear under certain *conditions* to prevent plants from assimilating large quantities of potash in excess of their needs, thereby conserving the potash supply within the soil. It does not appear unlikely, when the supply of potash is limited, that sodium salts may aid in some degree in performing some function of potassium."—*F. J. B.*

Soil Acidity, Summary of Experiments on the Relation of, to Fertility. By F. P. Veitch (*U.S.A. Dep. Agr. (Bur. Chem.), Bull. 90*).—A summary of a large number of experiments on soil acidity is given, and it is concluded that alkaline soils are more fertile than acid soils, and produce crops more economically than acid soils do; lime should be so applied that the soil is made alkaline to the full depth of cultivation. This is frequently not done.—*F. J. C.*

Soil Inoculation with Artificial Cultures. By Meade Ferguson (*U.S.A. Agr. Exp. Stn. Virginia, Bull. 159; January 1906*).—A concise account of the history of, experiments with, and collected information respecting inoculation for legumes. A summary of results shows:—

1. "Inoculation can be done successfully and profitably where care is taken in observing the proper methods."

2. "A conservative course is recommended. The recent wild enthusiasm, using such terms as 'vest pocket fertiliser,' 'act like magic,' &c. is misleading; while any statement that inoculation by artificial cultures is a fraud is equally wrong."

3. "No amount of inoculation or anything else will make up for an imperfectly prepared seed-bed, poor soil, bad season, and poor cultivation."—*F. J. B.*

Soil Inoculation, Some Field Notes on. By Hugh N. Starnes (*U.S.A. Exp. Stn. Georgia, Bull. 71, pp. 103-5; 12 plates; December 1905*).—Some interesting facts in connection with the development of root tubercles on legumes through cross-inoculation. It had previously been stated that "there is but one species of legume organism—*Pseudomonas radicicola* (Beyerinck). The difference in the infective power of bacteria from different hosts is due to slight physiological variations which can be broken down readily by cultivation." An attempt was made to ascertain to what extent "colonisation of the bacteria from one species of legume upon another may be feasible." Legumes of various species introduced at the station have invariably developed "full crops" of root tubercles, with no probability of inoculation from any other source than the *Coroepa* bacteria already in the soil. The list with figures which is given adds very considerably to the number of definitely recorded cross-inoculations.—*F. J. B.*

Soil Sterilisation. By F. W. Card and M. A. Blake (*U.S.A. Exp. Stn. Kingston, R.I. Part II. pp. 204-210; 1905*).—A report of experiments made to grow lettuces and radishes in pots, to ascertain if

anything can be done to assist growers of plants in greenhouses to combat the difficulties from fungoid diseases. Chiefly through these difficulties growers have usually to incur heavy expense in replacing the soil of the beds with fresh garden loam. The series of experiments consisted in growing the plants in each of the ways indicated:—Soil unsterilised; soil sterilised, and handled while hot; soil sterilised, but not handled till cold and dry; soil sterilised, handled cold, and later sprinkled with garden loam; soil sterilised, handled cold, and nitrate of soda used.

Results in different years vary considerably, but were such as to indicate that sterilisation, although it freed the soil of pests, also destroyed useful organisms, or, as one grower aptly stated, destroyed the "life" of the soil, so that plants do not make the vigorous growth they otherwise would do. These experiments are interesting and very promising, because if by sterilisation pests can be destroyed and the soil then be refertilised, or reinoculated with the useful germs, much laborious work in glasshouses will be rendered unnecessary.—*F. J. B.*

Soil Sterilisation, Practice of. By G. E. Stone (*U.S.A. Exp. Stn. Mass., 17th Ann. Rep., 1905*, pp. 10-14).—Sterilisation of the soil by high-pressure steam has been the means of lessening the amount of infection in lettuce houses where the plants have been affected by "drop," *Rhizoctonia*, or eelworms. Not only is this done, but the lettuce are stimulated into growth, so that they become more tender and have a looser head, unless a temperature of from 8° to 10° F. lower than is customary is maintained at night. *Botrytis* rot is more likely to attack plants of this kind than those grown more sturdily, but this can be avoided by careful handling and attention to temperature and watering. Cucumbers benefit by the use of sterilised soil, as they do not show the effects of the resulting stimulation to so marked an extent as the lettuce; a considerable acceleration is, however, given to the seedling as germination is hastened, the plants accelerated, and damping-off prevented. Carnation-growing is also apparently benefited by the use of sterilised soil. The author has never found any detrimental influence upon the soil itself, but has always used a soil rich in organic matter.—*F. J. C.*

Soil, Studies on the Properties of an Unproductive. By Burton Livingston, J. C. Britton, and F. R. Reid (*U.S.A. Dep. Agr., Bur. Soils, Bull. 28, 1905*).—An account of the investigation of the physiological properties of one of the most unproductive soils. Its physical nature and the nutrient substances found in its water extracts were apparently quite as favourable as those from fertile soils. It was shown that the soil investigated contained a water-soluble, non-volatile substance, or substances, probably organic in their nature, which are toxic to certain plants, causing a stunted growth. The toxicity of the soil is corrected by various substances, the more important of which are stable manure, green manure, calcium carbonate, and carbon black.—*F. J. B.*

Soil Testing in Paraffined Wire Pots. By H. J. Wheeler, B. E. Brown, and J. C. Hogenson (*U.S.A. Exp. Stn. Rhode I., Bull. 109* :

Oct. 1905).—Small pots* made of wire, then dipped into melted paraffin-wax, were used. The advantages claimed are that, as the pots are of small size, a large number of experiments can be made in a small glass house, the labour of handling and weighing is greatly lessened, the roots do not unduly accumulate at the sides of the pots, and the occasional toxic action of the metal is quite avoided. Numbers of tests are recorded, and it is claimed that the results of these tests are generally similar to what might be expected to occur in the field.—*F. J. C.*

Solanum Commersoni (*Le Jardin*, vol. xx. No. 453, p. 13; January 5, 1906).—The uninterrupted yield from this plant (the wild potato of Uruguay), its absolute immunity to cryptogamic diseases, its easy harvesting, and fine flavour give it great economic as well as scientific value. The Institut Agronomique has recently announced several new varieties. On p. 16 of the same issue of *Le Jardin* is a notice of a new book by Labergerie on this vegetable: *Solanum Commersoni et ses Variations*. J. Labergerie, 2.50 francs. Librairie Horticole.—*F. A. W.*

Sorrel-Spinach (*Rumex patientia*). By A. Pirlot (*Le Jardin*, vol. xx. No. 458, p. 92; with fig.; March 20, 1906).—A desirable variety of the common sorrel, inasmuch as it is ready early in spring, is less acid than other kinds, does not run to seed, and shoots out again after each cutting. It is much used in Algeria and Tunis. It should be treated exactly like common sorrel, *i.e.* sown in March and pricked out a month later. In warm climates an October sowing is preferable, as the plants are then fit to eat in early spring.—*F. A. W.*

Spraying. By G. F. Warren (*U.S.A. Exp. Stn. New Jersey, Bull.* 194, March 1906).—The aim of this publication is to summarise the methods of spraying found profitable in previous years in New Jersey, and the work appears to have been done in an excellent manner. It is pointed out that spraying is no longer an experiment, but has become part of the ordinary routine of the fruit-grower and market gardener. Apples, potatoes, pears, grapes, and strawberries are sprayed by most growers; cucumbers, cantaloupes, cranberries, and beans by many; while tomatoes, peaches, plums, cherries, and asparagus are profitably sprayed by a few. The chief materials used for spraying are listed as follows:—

FUNGICIDES.

Bordeaux mixture
Copper sulphate
Ammoniacal copper sulphate
Lime-sulphur-salt
Sulphur
Potassium sulphide
Formalin
Corrosive sublimate

INSECTICIDES.

Poisons.	Contact Remedies.
Paris green	Lime-sulphur-salt
Arsenite of soda	Sulphur
Arsenite of lime	Whale-oil-soap
Arsenate of lead	Kerosene emulsion
Hellebore	Crude petroleum
	Soluble oils
	Carbolic acid
	Hydrocyanic acid gas
	Carbon bisulphide
	Tobacco

* The pots are described in *U.S.A. Dep. Agr. (Bur. Soils), Bull.* 23, p. 38.

It will be seen from the foregoing lists that only one spray is of use both as a fungicide and an insecticide, viz. lime-sulphur-salt. A few others are occasionally of use, but it cannot be expected that one remedy will be of value against more than one of the three classes of enemies, although it is possible that many different pests may be killed by the same application. It at times pays to combine insecticides with fungicides, *e.g.* Paris green may be combined with Bordeaux mixture; but care must be exercised in doing this lest one substance should counteract the other. Recipes for the making of these sprays have been given in recent abstracts in this Journal. It is further remarked that the beneficial results from spraying are cumulative; they show in succeeding years, for not only are some insects and diseases reduced in numbers, but the trees, having good, clean foliage, grow more vigorously and form better fruit buds.

Careful directions then follow as to the spraying of particular crops, which are too lengthy to describe here: apples, asparagus, cranberries, cucumbers and melons, grape, peach, pear, plum, potato, strawberry, sweet potato, and tomato are all dealt with. A calendar of spraying operations then follows, with recipes for the making of the sprays (occupying together some twenty-six pages).

Various spraying machines are mentioned, but no full descriptions are given of these. The Vermorel sprayer is said to be the best.—*F. J. C.*

Spray Mixtures and Spray Machinery. By S. A. Beach, V. A. Clark, and O. M. Taylor (*U.S.A. Exp. Stn. New York, Bull.* 243; Dec. 1903, pp. 315-374; 53 figs.).—Recipes for the making of the following fungicides and insecticides are given. **FUNGICIDES:** Bordeaux mixture, soda Bordeaux, soda lime Bordeaux, Bordeaux dust, copper sulphate, Eau Céleste and soap, ammoniacal copper carbonate and soap, potassium sulphide, iron sulphate and sulphuric acid, formalin and corrosive sublimate (mercuric chloride). **INSECTICIDES:** Scheele's green, Paris green, London purple, hellebore, arsenite of lime, arsenite of soda, arsenite of lead, arsenate of lead, whale-oil soap, resin-lime soap, lime-sulphur-salt wash, lime-sulphur-soda wash, kerosene emulsion, crude petroleum and kerosene, hydrocyanic acid gas, tobacco, pyrethrum, and carbon bisulphide.

A description of the various types of spraying machinery follows, together with notes upon their efficiency.

This forms a valuable pamphlet for reference.—*F. J. C.*

Sterilised Soil and Germination. By G. F. Stone (*U.S.A. Exp. Stn. Mass., 18th Ann. Rep.,* 1906, pp. 126-134).—It was found that the majority of seeds tested were stimulated into growth sooner, and germination was more certain in sterilised than in unsterilised soil. Other experiments show that those soils containing little humus, after sterilisation, produce very small crops, although their influence on germination is about the same, and it would appear, therefore, that a considerable amount of humus is necessary in soils in order that crops may materially benefit by sterilisation.—*F. J. C.*

Strawberry Crown Girdler (*Otiorynchus ovatus* Linn.). By Edith M. Patch (*U.S.A. Exp. Stn. Maine Ann. Rep.* 1905, pp. 205-212

1 plate).—This insect, a near relative of the vine weevil, has caused considerable annoyance by entering houses in swarms. The larvæ of this beetle feed upon roots of grasses, and especially on the strawberry just at the ground level, so that the plant may be pulled up with the least effort. The adult beetle, which is black, will feed upon the leaves and flowers of a very large number of plants. The habit of getting into houses is due to seeking for shelter at midday. The adults cannot fly, but are active in running about. The only practical remedy is the cultivation of the strawberry in clean land.—*F. J. C.*

Strawberries in Ohio (*U.S.A. Exp. Stn. Ohio, Bull.* 154; September 1904; 14 figs.).—Gives an account of trials of a considerable number of varieties of strawberries, with notes on time of flowering, date of fruit ripening, yield, size of fruit, and habit and health of plants.—*F. J. C.*

Sugar Beet, Influence of Environment upon. By H. W. Wiley (*U.S. Dept. Agr., Bur. Chem., Bull.* 95; 1905; 3 figs.).—A review of the influence of environment on the sugar content &c. of the sugar beet. The sugar content appears to vary with the latitude, the lowest latitude producing the lowest sugar content, and *vice versa*. But, although the duration of light has so marked an influence, yet the variation in the length of clear sunshine seems to have a much less marked effect. The sugar content varies generally inversely as the temperature, while the distribution of the rainfall appears to have little influence on the quantity of sugar produced, though it is evident that there might be such a distribution as would interfere with the normal growth of the plant, and hence with the sugar content.—*F. J. C.*

Sweet Fennel (*Foeniculum dulce*). By François Charoneuse (*Le Jardin*, vol. xx. No. 460, p. 117; April 20, 1906).—This vegetable is a favourite in Florence, and deserves to be better known in England. It should be steeped in boiling water to remove excess of aromatic flavour, and is said to be superior to any cooked celery, endive, or chicory; or it may be eaten raw as a salad. It is easily grown, if sown in rows in light soil enriched with compost, and transplanted a month later to ordinary garden soil; the richer and deeper the beds, the more the fennel will flourish. On reaching maturity it should be trenched and treated exactly like celery. Slugs are very fond of it, and must be guarded against as soon as the plants are pricked out. It requires a good deal of water. The heads should be cut when the swellings at the base of the petiole are the size of one's fist. It keeps well and travels well; the heads were sold at 6*d.* each in the Paris markets last winter.—*F. A. W.*

Table Decoration. By E. W. Dix, and Emily E. Williamson (*Garden*, No. 1784, p. 49, Jan. 27, 1906; and No. 1785, p. 65, Febr. 3, 1906).—No hard-and-fast rules can be laid down as to methods of decorating tables. So much depends upon the likes and dislikes of those whom one has to please, the size of table to be decorated, and the material at command. At the same time, there are certain points which must always be carefully considered. Glaring contrasts of colour should be avoided. Some colours

which look very well by daylight are failures under artificial light; for instance, flowers of a yellow shade look much paler under gas or electric light. Bright shades of pink, crimson, or red always look well. Light blue and mauve do not light up well, but flowers of a purple shade are very effective. Generally, flowers that harmonise with each other give the greatest satisfaction.—*E. T. C.*

Tobacco Breeding. By A. D. Selby (*U.S.A. Exp. Stn. Ohio, Bull.* 156, November 1904; 3 figs.).—Details concerning the crossing and selection of the tobacco desired are given. The methods do not differ from those usually employed.—*F. J. C.*

Tobacco Diseases. By A. D. Selby (*U.S.A. Exp. Stn. Ohio, Bull.* 156, November 1904; 7 figs.).—The diseases dealt with are (1) mosaic disease, characterised by a mottled appearance of the leaves followed by distortion, and communicable to other plants by inoculation, but so far as is known not caused by a parasitic organism (see, however, *Journ. R.H.S.* xxviii. p. 301). (2) Root rot due to the fungus *Thielavia basicola* Zopf. (3) "Bed rot" due to *Rhizoctonia*. (4) Wilting of seedlings caused by *Alternaria tenuis* (?). (5) Wilt due to *Fusarium* sp. (6) Leaf blight caused by *Cercospora nicotianæ* Ellis & Everh. and spots caused by *Macrosporium tabacinum* and *M. longipes*. (7) Mildew (*Erysiphe communis* Lev. and *Phytophthora nicotianæ*). The broom-rapes, *Orobanche ramosa* and *O. ludwigiana*, also attack tobacco, and the troubles met with in the curing-house are also touched upon.—*F. J. C.*

Tree Culture of Violets. By Millet père et fils (*Le Jardin*, vol. xx. No. 458, p. 88; with 3 figs.; March 20, 1906).—The article first enumerates the many varieties of violets now in cultivation, and then gives simple directions for growing them as little flowering trees. The plants must be potted and repotted year by year in September in a mixture of sand, clay, and compost. In summer the pots should be buried in the garden, and be disturbed as little as possible. After repotting in September, the growth must on the contrary be encouraged and assisted. According to the form of tree desired, the stolons may be developed all round the plant, or a central shoot induced by nipping off all others until the stem reaches the desired height, when it is allowed to branch out. Extremes of heat as well as cold are to be avoided, a cold house or orangery being the best habitat, and the plants will then live and flower for ten years and more.—*F. A. W.*

Tree Mignonette (*Reseda odorata arborea grandiflora*). By Ad. van den Heede (*Le Jardin*, vol. xx. No. 461, p. 132; May 5, 1906).—Full directions are given for raising small standard trees of mignonette, which will live from two to four years. This plant does not prick out well, so it is best to sow in thumb-pots, and weed out all but the strongest seedling. Repot in July without breaking the ball. M. van den Heede's father, who raised 1,000 to 2,000 plants each year, used to smear the pots with liquid cow-dung before putting in the ball. The pots were then placed in a cold frame and buried in cinders, with plenty of ventilation, and the frame kept shaded. Drought and undue watering are both to be avoided.

All lateral shoots should be nipped off. At the end of August the plants are tied to a support, the top is pinched off, and six lateral buds allowed to develop. Keep in a cool house, giving plenty of liquid manure. In September pinch the tips of the branches and tie them also to supports. In winter avoid extremes of heat and cold, and attend daily to the plants in all the above particulars, keeping a look-out for the tiny green caterpillars with which they are often infested. The plants will flower from February to May. The finest should be preserved for seed, and it is well to strip off all but the best seed-pods, which then come to full maturity.

F. A. W.

Trematovolva Matruchoti parasitic on Limes. By H. Martinet (*Le Jardin*, vol. xx. No. 461, p. 131 ; May 5, 1906).—A parasitic fungus that is ravaging the lime forests of Wallachia. It first produces longitudinal slits like button-holes on the trunks and larger branches, and eventually causes neurosis of the entire tissue. It lodges in any accidental creek or wound and then scoops out a large circular cavity. M. Nicolas Jacobexo has been studying the disease for two years, but has not yet succeeded in finding a remedy.—F. A. W.

Tulipa Fosteriana. By W. I. (*Gard. Chron.* No. 1010, p. 322 ; fig. 130 ; May 26, 1906).—A very fine species recently introduced from Bokhara by Mr. C. G. van Tubergen. The flowers are very large, of a bright crimson colour, with a darker blotch at the base of the segments. It is of robust habit, and will probably become a favourite.—G. S. S.

Wall Gardening. By W. G. Howarth (*Garden*, No. 1790, p. 141 ; March 10, 1906).—The kind of wall that is best suited for wall plants is that known as the "dry wall," by which is meant a wall made of rough stones without mortar, and built against a backing of good soil. Such a wall is usually constructed at some place in the garden where a sudden change of level occurs, and may with great advantage take the place of some rough, sloping bank. I have constructed such a wall, and the method of procedure was as follows: The line for the wall is marked out half a foot or so from the bank, and a trench taken out to the depth of six inches. In this trench the first course of stones is placed along the whole length ; these should be fairly large, oblong, with a broad, flat base and fairly flat upper surface for the reception of the second course. The stones in the course touch each other, but no mortar is used in the joints. In laying a course it is well to use a trowel for roughly shaping the stones as they come to hand, and, in place of the bricklayer's pile of mortar, to have a pile of soil at hand with which, as far as possible, the joints are filled.—E. T. C.

Wardian Cases. By C. T. Druery (*Garden*, No. 1782, p. 32 ; January 13, 1906).—The plants most suitable for Wardian case-culture in rooms are comparatively few, and embrace practically no flowering plants at all, but only mosses and ferns, or, if they be kept very dry and given plenty of air and sun, cacti may be grown instead with pretty though curious effect. The only benefit, however, which cacti derive from case culture is some protection from dust, since they are naturally inhabitants

of sunny, dry places, exposed to every wind that blows, and thus exactly opposed to the conditions for which Wardian cases were invented.

Undoubtedly the fittest plants of all are the filmy ferns, a somewhat numerous tribe of plants which only thrive in very shady damp places whence drying winds are always excluded.—*E. T. C.*

Willows for Basket-making. By A. D. Webster (*Garden*, No. 1798, p. 241; May 5, 1906).—Preferential railway and boat rates, aided by keen foreign competition, have well-nigh rendered the time-honoured industry of basket-making a thing of the past in this country. The best classes of osiers, cleaned and ready for manipulation, are now delivered to our principal markets from Continental sources at so low a price that competition on our part is almost out of the question. There are still, however, a few stations, such as in Bedfordshire, the Fen districts of Lincoln and Cambridge, and along certain reaches of the Thames, where willow culture is engaged in, though not in the same energetic way as was the case some half a century ago.

It is, perhaps, difficult to estimate correctly, but about 7,000 acres, producing roughly 20,000 tons of osiers, are cultivated in this country at the present time, many small plantations having been grubbed up and the land laid down in other crops during the past five-and-twenty years.

E. T. C.

Window Gardening. By E. Lloyd Edwards (*Garden*, No. 1796, p. 217; April 21, 1906).—To begin with, a box must be constructed to fit the window as deep and wide as the space will allow; some holes must be made in the bottom of it, and it should be painted leaf-green. In this 2 inches of crocks and a few lumps of charcoal must be placed to ensure good drainage. The composts or soil must be carefully prepared, and should consist, if possible, of two-thirds good fibrous yellow loam and one-third of well-rotted manure, with plenty of coarse silver-sand mixed through it. Some people use leaf-mould instead of manure, but it is liable to become sour. If the window garden is started in September the soil need only be renewed once during the year, when it is replanted for the summer. Thinking out the arrangement of the window garden is a delightful occupation combined with the study of plant and bulb lists. There are so many things to choose from.—*E. T. C.*

Winter-killing of Peach Trees. By W. J. Green and F. H. Ballou (*U.S.A. Exp. Stn. Ohio, Bull.* 157, December 1904; 9 figs.).—Many trees are killed during the winter by the frost in the Lake Erie district. It is concluded that, while the direct cause of the injury is the intense and prolonged cold and hard and deep freezing, trees of low vitality, generally speaking, suffer most. The causes of impaired vitality appear to be (1) poverty of the soil; (2) a poor physical condition of the soil; (3) the prevalence of San José scale; (4) leaf-curl; (5) the peach-borer; (6) the extremely dry condition of some of the soil; and (7) the water-logged condition of other orchards. The practice of sowing annual cover crops and attention to the foregoing points are recommended. The piling of a few forkfuls of farmyard manure round the stem of a tree has at times proved its salvation.—*F. J. C.*

Winter-killing of Plants in Massachusetts. By G. E. Stone (*U.S.A. Exp. Stn. Mass., 18th Ann. Rep. 1906*, pp. 119-124).—It is pointed out that injuries due to frost are of various types: root-killing; killing of aërial portions of plant; frost-cracks; twig-killing; bud injuries; blisters on leaves, particularly of apples. The conditions contributory to winter-killing in addition to intense cold are treated upon, and a long list of plants is noted which were affected in severe winters.—*F. J. C.*

Witsenia Corymbosa (*Le Jardin*, vol. xx. No. 454, p. 22; January 20, 1906).—A plea for the revival of a charming plant well known to the gardeners of 1848, and of which several varieties exist at Kew under the name of *Aristea*. An iridaceous plant, a native of South Africa, it sends up its purple spikes from September till late into the winter. Too hot a sun and too much watering are alike to be avoided. It should be planted in small well-drained pots, repotted, and divided in March.—*F. A. W.*

COMMONPLACE NOTES.

THE BEST PINES TO PLANT BY THE SEASHORE.

THE following reply was given to certain queries on the subject of growing pine trees in situations near the sea by a very well-known authority on *Coniferae*. "The pine of all others for such a situation as you describe is the black Austrian pine (to give it the name by which it is best known in the trade). Next comes the *Pinaster*, but that suffers from the wind and becomes scraggy. *Pinus contorta* is good, but not very common in nurseries; *Pinus montana* is low-growing; *Pinus Banksiana* is very hardy, low-growing, but not often met with; *Pinus insignis* will do if not too much exposed; *Pinus sylvestris*, the common Scots fir, will do if protected in its early stages. I might mention other pines, but they are not common in the nurseries. So much for pines. Then, as the situation is not at all exposed, I should certainly try *Cupressus macrocarpa*: it grows fairly quickly on chalk and makes a splendid screen. The evergreen oak does excellently on the chalk close to the sea. To sum up, I should try *Pinus austriaca*, *Cupressus macrocarpa*, *Quercus Ilex*, with undergrowth of double gorse, *Lycium sinense*, tamarisk, to serve as nurse plants and be cut away as the pines get up. A look round the gardens at Eastbourne would doubtless supply other hints."

TREES AND SHRUBS FOR THE SEASIDE.

On many occasions recently we have been asked what may be planted successfully by the seaside, more especially for places on the Eastern Coast and positions where the soil is poor, and frequently nothing but shingle. One of the best trees we know is the evergreen oak; but many say, "Oh, we have tried it, and it dies!" The reason of this is that few trees are more difficult to transplant than the evergreen oak, and unless they have been moved annually previously they are almost sure to die anywhere, and for that reason it is advisable to purchase plants in pots and plant them out in sites specially prepared for them by the addition of good soil, some well-rotted manure, and, if convenient, the ashes from a burnt garden refuse heap. This would give them a good start, and if followed up every year with a light mulch of rotten manure it is astonishing how rapidly they will grow and form a delightful screen inside of which less hardy shrubs may be placed. We have seen *Picea sitchensis* answering admirably by the coast in exposed cold places, and the common alder is not to be despised for an outer belt. All the varieties of thorns, again, succeed very well, and if there is no objection to acubas and euonymus they may be planted in exposed positions. Another tree we can recommend is *Pinus austriaca*, and with a little shelter *Pinus insignis*. Most varieties of the holly

thrive well inside a belt of any of the above, forming a splendid screen or break against winds for much tenderer plants. Other useful seaside plants are broom, gorse, sweet briar, *Rosa rugosa*, cotoneaster in variety, sea-buckthorn, tamarisk, elder (golden and others), escallonias and poplars, elms and mountain ash; but with all of these it is essential they should have a good start by being provided with suitable soil about their roots, so that they may become established quickly, and it is scarcely necessary to add that all should be securely staked immediately they are planted.

PLANTING HOLLIES.

There seems a great deal of doubt as to the best time to plant hollies, and many persons would be only too glad to make hedges or screens of holly if they were not afraid of losing their plants, or that their growth would be very slow. We have planted hollies in practically every month of the year and found from the beginning of May to the middle of June, and from the middle of September to the middle of October, the best time to plant. If the weather be dry at the time of moving, the plants should be thoroughly soaked with water immediately after planting, and a good sprinkling overhead in the evening is very beneficial. It is important that the roots should not be exposed and become dry from the time they are lifted until replanted. Again, sometimes planting must be done during the winter; in that case they should not be moved in frosty weather, as few plants resent it so much as the holly. In purchasing plants from the nurseryman it is always advisable to make sure they were moved the year previous. They will then bear shifting without scarcely noticing the change. When making alterations in the grounds, and it is necessary to move large hollies to another place, they ought to have a wide trench dug round them the year before moving; otherwise they will be almost sure to die, as they will not have a good ball of roots. As to the holly being of slow growth, much depends on the preparation of the site. If the drainage is good and the soil enriched with well-decayed manure, and deeply dug, they will make astonishing progress, and an annual mulch of the same will keep them growing rapidly. To keep the plants bushy, and form a thick hedge from the ground upwards, a certain amount of clipping or stopping of the leading shoots will be advisable every year.

BAMBOOS FLOWERING.

During the past two years bamboos have been flowering over most parts of the kingdom, and very often we hear the remark, "I wish I had never planted any bamboos," because they leave an objectionable gap when they die, as they invariably do after blooming. It would be a lamentable loss to our gardens over the whole country if bamboos lost favour through their flowering, as nothing we know can replace their beautiful habit and charming colouring all the year round, and the question naturally arises as to what can be done to prevent their flowering. In our opinion the first and chief cause is starvation, as the bamboo does not send its roots to any great distance away, and the

persistent "cleaning up" of leaves &c. removes practically all the plant-food they would receive naturally. The consequence is that when all the plant-food is exhausted the plant declines in health; and as nature always tries to reproduce itself, flowering takes place, and the loss of the plant follows. The numerous losses that have occurred during the past two or three years may probably have been brought about by the droughts of recent summers, the soil being too dry for root extension, thus causing starvation more or less. Some of the finest bamboos we know have for years had a thorough soaking several times a year with sewage, which has kept them in rude health; and in another place, where they are very fine, a liberal mulch of well-rotted manure is applied every spring, with a thorough soaking of water should dry weather set in. With plants on lawns or grass, mulching with manure or sewage may be impossible; but there is no reason why diluted liquid manure could not be given occasionally, or a dressing of guano early in May, at the rate of two ounces per square yard superficial for at least six feet all round the plant. Plenty of moisture and good feeding are not only beneficial to bamboos, but will prevent their loss by flowering.

FAILURES WITH STRAWBERRIES.

"Why do my strawberries fail?" wrote a Fellow recently, adding: "The plants are vigorous, apparently in rude health, but they produce no fruit." This occurs more frequently than many would imagine, and is produced generally by a very simple cause—viz. runners taken from young, vigorous, unfruitful plants. In every strawberry bed, unless the runners have been selected with care, there are a few barren plants: these produce the earliest and finest runners, and the man who goes to take up the runners for potting or planting selects the best he can get, never thinking they may be from barren plants. This goes on year after year, until eventually very little fruit is found in spite of good culture and very fine plants. Another cause of failure, in our opinion, is the continuance of the same stock for a number of years: they may not wear out in growth, but they wear out in fruitfulness, and a change of stock is most desirable, not only with strawberries, but many other garden crops.

Soils play a very important part in strawberry culture, and if light and sandy, it is almost useless to attempt growing such fine-flavoured varieties as 'British Queen,' 'Dr. Hogg,' and others of that type, as they require a strong loamy soil to do them justice. Such a soil will grow practically any variety; but on a light sandy soil the choice of varieties that can be relied upon is limited. At the head of such we should, without any hesitation, place 'Countess,' an old first-rate-flavoured variety, nearly lost to cultivation a few years ago. 'Dumbarton Castle' is a small growing, free-bearing variety, of good flavour; and as a late variety Givon's 'Late Prolific' is excellent in every respect. 'Filbert Pine,' 'Vicomtesse Héricart de Thury,' and 'Eleanor' are all reliable on light soils, and also on heavier soils, except 'Countess,' which does not ripen well at the points of the fruit on heavy soils.

SHOT-HOLE FUNGI.

Certain fungi are commonly known as "shot-hole fungi" on account of the leaves which have been attacked by them having the appearance of having been riddled by a charge of shot. The holes caused by these fungi when they become larger (sometimes one or more becoming confluent) very much resemble those made by certain insects when feeding on the leaves, and it is difficult sometimes to decide whether the injury has been caused by a fungus or an insect. In this connection the following letter was received from one correspondent:—

"We have a large plant of *Romneya Coulteri* which I got about four years ago.

"The second year here it flowered grandly.

"The third year it had some flowers, but was eaten to pieces by something.

"This year it bore only two flowers, and was terribly eaten all over. We have a good and careful gardener, but both he and I are puzzled, as we have watched and searched in vain, only catching a few earwigs and three or four green caterpillars.

"We have tried liming the ground and syringing the bush, but nothing seems of any use. I am sending you a few of the branches in case you can kindly help us."

The reply given to this letter was as follows:—

"The *Romneya* is attacked by one of the shot-hole funguses, *Cladosporium elegans*. The bits of leaf that drop out carry the fungus fruit which produces infection next year; hence the surface soil should be removed during the winter and fresh soil added. Spraying with sulphide of potassium—one ounce to three gallons of water—will check the spread of the fungus on the living leaves."

BLACK CURRANT RUST.

Cronartium ribicolum.

This rust was first brought to my notice as a British species from Haslemere, September 21, 1906, although known on the Continent for some generations. It occurs on the under surface of black currant leaves, where the uredospores are found in crowded pustules of an orange rufous colour. The spores are elliptical, oval or ovoid $19-35 \times 14-22 \mu$, with a hyaline coat, and orange contents. At length a slender columella issues from the centre of each pustule to about 2 mm. high, which is curved, yellowish, and horn-like, composed of one-celled teleutospores. These often germinate at once, bearing two or three secondary spores near the end of the germ tube.

This is now regarded by many as a heterœcious uredine, with its æcidium stage on living bark of the Weymouth pine, this condition being known as *Peridermium strobi*.

It is advisable to collect and burn all currant leaves attacked by the parasite and syringe all the bushes with Bordeaux mixture. This may minimise future attacks, but it is doubtful whether it will make the bushes recover.—M. C. C.

ACETYLENE GAS REFUSE.

This material has been used with excellent results if treated in the same way as gas-lime, namely, by spreading it on the land at the rate of half a ton per acre, and letting it lie there for a fortnight. It should then be dug in, and a month later the soil should be again turned over so as to thoroughly incorporate the refuse with it. The crops were first-rate, and no insect pests could be found in the ground.

THE FLAVOUR OF POTATOES AND ARTIFICIAL MANURES.

The following letter was received from a correspondent :—

“We have found a difficulty in this locality in selling potatoes grown with artificial manures such as superphosphate, nitrate, and kainit; the purchasers say the flavour is objectionable, and entirely owing to the use of these. Would you be so kind as to tell me if this is the general experience, and if so, what manures are the most undesirable? We should particularly like to know whether basic slag is prejudicial, and in what way; also whether gas-lime has any effect on the flavour.”

The following answer was given to the above from an expert :—

“Broadly speaking, manures do not influence the flavour of potatoes objectionably. The only exceptions worth considering are rank dung in contact with the tubers; muriate of potash, which contains chlorine; superphosphates repeatedly used in quantities, when the soil may become acid (this can be avoided by always using a little steamed bone flour with the super, as it absorbs the free acid). Nitrate, kainit, basic slag, do not influence the flavour; gas-lime is very dangerous stuff, and had better not be used. Unquestionably the great determining factor in flavour is the texture of the soil. In sandy loam the flavour is invariably better than in clay.”

In reply to an inquiry as to the value of common salt for a dressing for potatoes the following reply was given :—

“Common agricultural salt at the rate of five hundredweight per acre is excellent for potatoes on light or fairly light land, and may be put on broadcast in March or immediately after planting. I have used it just after planting.”

REVIEWS OF BOOKS.

"Eton Nature: Study and Observational Lessons." By M. D. Hill and W. M. Webb. 8vo. Part I. 155 pp. Part II. 174 pp. (Duckworth, London.) 3s. 6d. net each.

Like other books of this class, the "Lessons" are chiefly on the Animal and Vegetable Kingdoms, with one on Clouds. It is beautifully illustrated. Of course, it consists almost entirely of facts to be observed. Their use is to excite an interest in Nature, and supplies information. Such is the preliminary stage of education. Young people, as a rule, are inquisitive, and ask "whys" and "wherefores," and it would add interest to the lessons if the teacher supplemented the observations with additional matter. Thus, a good figure of "The Flower of a Dwarf Bean" is given for the sake of observations on the pod; but the opportunity of explaining the screw-like keel is missed. There is no mention of its pollination. The method of describing everything minutely cultivates the observing powers and trains the pupil in acquiring an accurate habit of mind. This is the chief value of Nature-study, or, rather, object lessons in natural history; but they must not be regarded as an "end," but only a preliminary "means" towards instruction and true education. These can only be attained by taking some subject, either botany or zoology, and following it out, by examinations of entire examples, making full descriptions, accompanied by laboratory work and other indoor study with the aim of ecology, *i.e.* the application of a plant's morphology and anatomy to its actual requirements while living in its natural habitat. The only danger, as it appears to us, is to continue object lessons too long before beginning botany as a school subject, and to avoid its degenerating into cramming, which is the accumulation of facts, without their interpretation.

"Guide to the Principal Families of Flowering Plants." By T. Adams. 8vo. 46 pp. (Sealy, Dublin.) 1s. net.

This little pamphlet is offered as likely to be useful to gardeners, nurserymen, and students for examinations &c. It consists of an elaborate analytical guide to find out the name of any family. To a beginner the labour in discovering the name of a plant is often very great and tedious, and in the end uncertain. This is due to the fact that species are not absolute entities, and often exhibit a character growing in one place which is not possessed by the same species elsewhere, and so not recorded in a "flora." To find a family is less difficult; but unless the descriptions cover all possibilities, even with them the result may be uncertain. With regard to the present Guide we cannot regard it as an improvement on Bentham's "Analytical Key" (the usual French method) at the beginning of his handbook.

It is the exceptions which puzzle beginners. Thus the author says of a primrose: "The leaves show a net-veined arrangement, and the parts

of the flower are in fives. Accordingly it is a Dicotyledon." But suppose fours stood instead of fives, it would not only answer for willow-herb, but also for *Paris*, a Monocotyledon. One character of this latter class is given as "stems with scattered fibro-vascular bundles." This may be true for a palm-stem; but suppose a gardener tested it with herbaceous flower stems, he would find but little difference, if any, between them in both classes. As other puzzling statements—it is said, "Corolla coloured [white omitted]. Perianth usually 3+3." Under "Marsh and Land Plants" are *Typha* and *Spartanium*, both of which are often actual water-plants. As Dicotyledons contain so many families the use of signs soon becomes very complicated; and we doubt much whether a gardener will work through the series till he comes down to PPPPK2+2, C4, A4— ∞ , $G^{(2-\infty)}$, which stands for *Capparidaceæ*.

"The Self-educator in Botany." By R. S. Wishart. 8vo. 226 pp. (Hodder & Stoughton, London.) 2s. 6d.

"This book is written for those who are prepared to examine actual specimens." No one who wished to learn botany would do otherwise, and this book will be a help, but in no sense a substitute, for practical work. It is in two parts: one deals with the various plant organs, the other with classification. The figures are somewhat crude, but sufficient as guides to help the beginners. We note a few statements which should be corrected if a future edition be required. First, there is no index, a serious omission. On p. 39 there is no mention of the pericycle: it appears to be united with phloëm as prosenchyma. "Pyliferous" is frequently written for "piliferous," as on pp. 4, 6, 7, 8, 9. The root-cap of Dicotyledons (except aquatics) is not distinct as in Monocotyledons (p. 49). We think the expressions "intelligence and selfishness," "robbing and murder," misleading and out of place; the tentacle of a sucker might be more accurately drawn; the gland is misleading (p. 101), &c. If the student does not attempt to use the book for cramming purposes, it may be a help; but to attempt to write out a description, as of *Bursa Bursa-pastoris* given on p. 176, requires a more elementary training in describing plants for a self-educating botanist. Why does the author not give the accepted name *Capsella*?

"Wayside and Woodland Blossoms." By E. Step. 8vo. Series I. 176 pp. Series II. 171 pp. (Warne, London.) 6s. net each.

A few criticisms might be made on these excellent little books, which are very suitable for anyone who wishes to know our principal wild flowers without trouble. The author's teleological tendencies are hardly compatible with modern ideas; e.g. "acridity appears to have been developed as a defence against herbivorous animals." Evolution does not recognise structures made in *anticipation*, but only as *results*.

The only objection of importance we feel inclined to make is that the illustrations follow no order. If the idea of the author is that the reader may regard our wild flowers botanically—and the index suggests such to be the case—it is most important that beginners should learn the sequence of the families as described in our floras from *Ranunculaceæ* to *Gramineæ*.

The eye should be taught this, as wrong impressions are difficult to eradicate; then to find the lady's smock and celandine intercalated between *Clematis* and *Caltha* is bewildering.

"A Glossary of Botanic Terms." By B. Daydon Jackson. Second edition. 8vo. 371 pp. (Duckworth, London.) 7s. 6d. net.

We are not surprised to see a new edition of this admirable and most useful book. The first edition had 319 pages, the present one 371. It has involved a very great amount of labour, and all botanists must feel greatly indebted to Mr. Jackson for the great pains he has taken in compiling it.

"Scientific Lectures." By Right Hon. Lord Avebury. Third edition. 8vo. 232 pp. (Macmillan, London.) 6s. net.

The first edition was published in 1879, and is now so well known that it will be needless to say more than, as young scientists keep rising up, that they should all study these admirable addresses. They deal with flowers and insects, plants and insects, habits of ants, pre-historic archæology, and an inaugural address to the Institute of Bankers.

"A Historical Geography of the British Colonies." Vol. II.: The West Indies. By C. P. Lucas, C.B. 8vo. 348 pp. (Clarendon Press, Oxford.) 7s. 6d.

Section I. deals with the Bermudas, and gives a concise history from its discovery to the present day; the structure of the islands, scenery, details of population, trade, &c.

Section II. contains nine chapters, and treats of the West Indian dependencies of Great Britain. Each island or group is discussed as above with the Bermudas.

Section III. is devoted, in a similar manner, to the Falkland Islands and S. Georgia.

Altogether the information should prove most useful to anyone in any way interested in these outlying dependencies of Great Britain.

"The Romance of Plant Life: Interesting Descriptions of the Strange and Curious in the Plant World." By G. F. Scott-Elliot. 8vo. 380 pp. (Seeley, London.) 5s.

This is an extremely interesting volume, consisting of twenty-nine chapters, each on a different subject: such as "The Activity of Vegetables"; on Savages, Doctors, and Plants; a Tree's Perilous Life; on Tea, Coffee, Chocolate, and Tobacco, Rocks, Stones, and Scenery, &c. The author has had the advantage of extensive travel, and so has seen the things he describes; but in addition to this he has most diligently searched the works of others for an enormous mass of interesting information. The result is a most readable and instructive volume. Numerous photos from nature as well as excellent ideal pictures (as of lake-dwellings in early Britain) enhance the value of the work.

“Plant Life: Studies in Garden and School.” By H. F. Jones. 8vo. 260 pp. (Methuen, London.) 3s. 6d.

This book makes no pretence of teaching botany in schools on the usual system, but it is an excellent work for the practical department of it. The author does not say if botany is otherwise taught to his pupils, and the only reference to the structure of flowers is of species of *Liliaceæ* and *Gramineæ*. The book has much the same value as all others on “nature study,” in consisting of more or less independent matters of interesting information, but it has the additional advantage of being all on one subject, or plant-life. Hence it is more instructional than most books of this class, which so often deal with isolated facts of all the three kingdoms of nature.

The great educational value of botany lies in the cultivation of the observing powers—and practical work is eminently qualified for securing this—and if everything observed is always described in writing, the second use is the acquisition of accuracy of thought and habit.

The usual methods of describing plants in full, from root to flower, coupled with their classification, cannot be surpassed. Moreover, when the flower—as it should always be—is examined with the view of ascertaining its method of pollination, a good deal of thought and judgment is brought into play, as well as in determining its position in classification. This must always be the basis of school botany. A feature which is not alluded to in this work—viz. the use of its organs to a plant as it lives in nature or ecology. This word is not in the index. As public examiners in botany now ask direct questions in ecology, and expect candidates at least to know what it means, we maintain that the applications of “plant-life in the garden and in the school” should always have ecology as their aim. A good teacher can always bring his experiments to bear upon it. Excellent, as far as it goes, as this book is, the absence of any ecological aim in it is a decided want.

If, however, a teacher in any school on the old and sound plan of plant description and classification as his basis will carry out the experiments herein given—as representing the practical department—and then always add the ecological bearing of the observations made in the school, and illustrate them in walks and excursions—then, with these additions, we can thoroughly recommend the book.

“Life and Matter: A Criticism of Professor Haeckel’s ‘Riddle of the Universe.’” By Sir Oliver Lodge. Fourth edition. 8vo. 200 pp. (Williams & Norgate, London.) 2s. 6d. net.

We are glad to welcome this little book. Others have attacked Haeckel’s theories from the biological side;* but Sir O. Lodge, being an expert physicist, is able to supply crushing replies to questions raised by Haeckel’s theories, in which he invades an almost *terra incognita* to him.

The author proposes to confute two errors. The first is that “because material energy is constant in quantity therefore its transformations . . . are not susceptible of guidance.” The second is that the specific guiding power, *i.e.* “life,” is a form of material energy or a form of force.

* *E.g.* Henslow’s *Present-day Rationalism critically examined*.

The book contains ten chapters. The first two discuss Haeckel's "Monism" and his "Law of Substance," with quotations; and he observes: "To curb these extravagant pretensions it is only necessary to consider soberly what these physical laws really assert." Sir Oliver then deals with the Development of Life, showing the fallacy of Haeckel's contentions, which maintain that all of man's psychical phenomena are foreshadowed in the primeval cell." In other words, he (Haeckel) appeals to a presumed sentiment of biologists against the knowledge of the physicist in his own sphere—a strange attitude for a man of science. After this it is less surprising to find him ignoring the elementary axiom that "action and reaction are equal and opposite." With regard to "Religion and Philosophy," "Mind and Matter," "Will and Guidance," "Further Speculation as to the Origin of Life," &c., these are all excellently treated; and if Haeckel's followers were not so prejudiced in his favour, and accept him almost as infallible authority on monism, this book ought to do much good in counteracting the extravagances of the author of the "Riddle."

"Seasonal Botany." By M. O'Brien Harris. 8vo. 56 pp. (Blackie & Son, London.) 8d.

A supplementary text-book, including: I. Outline Course of General Botany; II. Detailed Course of Physiological Botany.

This little book is divided into two parts: Part I. contains a syllabus of a first year's course (two pages); ditto second year's (one page), with a two-paged table of procedure for autumn, spring, and summer, *i.e.* five pages in all.

Part II. is on physiological (laboratory) work and occupies thirty-four pages. The reader will thus see the obvious bias of the authoress. The two-paged syllabus of the first year is a "summary, showing the facts (chiefly morphological) which underlie the work of the first year," *e.g.* plants, flowers, fertilisation, seed fruit, roots, reserves, stems, and leaves. Nothing is said of the dissections and written descriptions of plants which form the most valuable part of educational botany for beginners. The statement that "the blackboard or the pupil's note-book shows at the end of a lesson its main points" seems to indicate the faulty system of trying to teach by lectures, instead of entirely by the pupils' own observations on living plants.

The sentence "Fruits are . . . formed from one carpel or the union of several" is not sufficiently accurate; for in many plants the fruit consists of numerous separate carpels, as the buttercup, strawberry, &c. The following is also misleading: "Plants are fixed creatures [many *algæ* are not]; therefore they attain a greater size than animals." It would be difficult to find a sentence requiring more qualifications. An oak tree is usually larger than a dog; but the latter is larger than a daisy, and lives longer than any annual!

The sole value of the book resides in Part II., for the sake of the numerous experiments; but these, too, require a qualification, for they are entirely confined to phenomena of plant-life as treated in the abstract. There is a total absence of any attempt to correlate them with plants as growing wild in nature, *i.e.* in their natural surroundings. The writer

appears to know nothing of ecology, or the present-day method of teaching botany in the field, as well as in the laboratory, which should always have the former as its sole aim and object.

"The Principles of Heredity." By G. Archdall Reid, M.B., F.R.S.E. Second edition. 8vo. 379 pp. (Chapman & Hall, London.) 12s. 6d. net.

The author of this work maintains that variations, with very rare exceptions, are spontaneous; in other words, he insists that offspring differ inherently from their parents quite independently of the action of the environment. He supposes that the germinal cell-descendants of the fertilised ovum vary amongst themselves for precisely the same reason as the somatic descendants vary when some become skin, others bone, and others muscle-cells. He points out that, though the germ-cells from which spring a litter of puppies, kittens, or pigs have all existed under practically identical conditions, yet the members of the litter may, and indeed always do, vary greatly in all sorts of different directions. Moreover, from time immemorial many human races have been exposed to diseases which literally soak the germ-cells in virulent toxins; thus Negroes on the West Coast of Africa have suffered for hundreds of generations from malaria. If the action of the environment were the cause of variations, then presumably the toxins should injure the germ-plasm and cause deterioration of the race. But no such result follows; on the contrary, every human race is resistant to every disease precisely in proportion to its past sufferings from it. It undergoes progression, not deterioration. Thus Negroes, a fine race physically, are very resistant to malaria and Englishmen to consumption, whereas Polynesians who have suffered from neither are very susceptible to both when exposed to infection. We are driven therefore to the conclusion that variations are spontaneous, that they tend to occur all round the specific mean like bullet-marks round a bull's-eye, and that thus are provided the materials for natural selection. If variations were not spontaneous the race would drift helplessly to destruction; for natural selection would have no scope when variations are all in one direction.

The author maintains that the study of disease is a very valuable means of investigating the problems of heredity. Every disease supplies us with an enormous series of experiments which have already been statistically tabulated. Moreover, we are able to eliminate errors of observation and reasoning by comparing, not only individuals, but races. Our knowledge of human beings is more intimate and minute than our knowledge of lower animals and plants; our observations, therefore, are more accurate and extensive. Disease is the only form of selection to which civilised races are now exposed, other forms of death being rare and non-selective. He discusses the influence of diseases on the fortunes of human races. The capacity for becoming civilised is physical not mental, and depends on ability to resist the infective diseases which prevail when human beings are crowded together. All, or almost all, infective diseases originated by the evolution of saprophytic microbes into parasitic forms in the long and densely populated centres of the eastern hemisphere, the inhabitants of which, under conditions that

slowly grew worse, underwent evolution against them. The voyage of Columbus began their introduction to the western hemisphere, the inhabitants of which are everywhere disappearing owing to their inability to achieve at once an evolution which the peoples of the old world achieved only after the lapse of ages and at the cost of millions of lives.

"In times now far remote in the history of civilised peoples the sword was the principal means for digging deep the foundations of permanent empires. Its place was taken by a more efficient instrument. A migrating race, armed with a new and deadly disease and with high powers of resisting it, possesses a terrible weapon of offence. But now disease has spread over the whole world, and so is losing its power of building empires. The long era of the great migrations of the human race, of the great conquests, is closing fast."

The author insists that the true distinction between instinct and reason lies in the fact that the latter is founded on memory, whereas the former is not. Thus a caterpillar, which is guided by instinct, does not learn to spin its cocoon; but the man, who is guided by reason must learn to build his house. Comparatively speaking, man has very little instinct, but is compensated by the immense range and amplitude of his memory. Compare what is remembered by the dog, for instance, with all that is learnt by his master, including the words of a language and all that is transmitted by one generation of men to the next by language. The author believes, therefore, that many racial mental differences, which are popularly believed to be innate, are due to nurture, not to nature. Birth counts for very little, education for very much, in the case of the average human being.

A variation must be progressive or retrogressive. The former implies a complete recapitulation of the parental development plus an addition; the latter an incomplete recapitulation. Since every individual from the beginning recapitulated (with variations) the development of the parent, it follows of logical necessity that the development of the individual is a recapitulation (with additions and omissions due to ancestral variations) of the life-history of the race. Every species that consists of males and females is dimorphic as regards the sexual characters. The inheritance of these sexual differences is alternative—that is, only one set of characters appears in the individual, the other set being transmitted in a latent condition to offspring. The inheritance of non-sexual differences, on the other hand, is, as a rule, not alternative. It is either blended or exclusive. An example of blended inheritance is seen in the mulatto; an example of exclusive inheritance is seen when one parent has a mole on the face and the children and descendants all follow after the other who has none. Sexual differences between parents are considerable; non-sexual differences, as a rule, are inconsiderable. When, however, the latter are considerable they tend to be transmitted alternatively like sexual differences. Hence the Mendelian phenomena, which, therefore, according to the author, are merely anomalies of sexual reproduction. It will be seen that, while not denying the existence of these phenomena, he denies biological importance to them. The function of sex according to him is the elimination of useless progressive variations—*e.g.* a mole. Blending itself is a form of retrogression, since the peculiarities of both parents are

reduced towards the specific mean. He rejects also the mutation theory of evolution on the ground that the complex and delicately co-ordinated structures of animals could not possibly have been evolved otherwise than by gradual concurrent change. Lastly, since all structures and organs tend to disappear on cessation of selection, he rejects, with some reservations, the theory that stability is conferred otherwise than by continued selection. The whole work is written very clearly, so that the ordinary reader should have no difficulty in grasping its meanings. Part of it is devoted to a consideration of practical problems affecting man.

Altogether the book is admirably compiled and many of the observations are original and acute.

It is, however, only fair to the author to point out that the book was compiled previous to the recent Mendelian discoveries, the author's observations on Mendelism and mutation being necessarily relegated to the appendix and a few footnotes. It is obvious that in such circumstances the author cannot do justice to either subject or to himself.

Apart from these shortcomings the book is a valuable addition to the literature of the subject.

"Familiar Trees." By G. S. Boulger, F.L.S., F.G.S., &c. Vol. I. 8vo. 160 pp. (Cassell & Co., London.) 6s.

This is a useful book and contains within its 160 pages nearly all that is worth knowing regarding the eleven species of trees and shrubs that are so ably described and faithfully illustrated in the first series. With the inclusion, however, of such species as *Viburnum*, *Clematis*, and *Tamarisk*, a more descriptive title for the work would, perhaps, have been found in "Familiar Trees and Shrubs."

The book is of very convenient size, well arranged and printed, and the numerous illustrations, which are true to nature, should render recognition of any species a matter of the simplest, while the text, too, is exhaustive and to the point. The remarks at page 46 on pruning are, unfortunately, only too true, and might well be extended to our London plane and lime, both of which are cruelly treated at the hands of the so-called pruner, and deprived of all their natural beauty by the annual hacking and hewing to which, in many streets and squares, they are annually subjected. The mulberry might well have been instanced as a capital tree of moderate dimensions for planting in smoky localities. And why are not the English and Scotch laburnums differentiated?—for they are equally distinct and familiar. From personal observations regarding the *Arbutus* in the South of Ireland we should be inclined to catalogue it as a British tree—a small matter, perhaps, considering how well the species succeeds around Killarney. Altogether Professor Boulger's book is one that must be highly recommended to the lover of our commonly cultivated trees and shrubs, for both text and illustrations are excellent.

"Soils." By E. W. Hilgard, Ph.D., LL.D., Professor of Agriculture in the University of California and Director of the Experiment Station. 8vo. 593 pp. (Macmillan, New York and London.) 17s. net.

A volume originally designed as a text-book and for reference by students attending the writer's course on soils. A preliminary knowledge of

physics, chemistry, and botany is assumed, and practically the whole of the book is devoted to the applications of these general subjects to the study of soils, more particularly cultivated ones. It describes the formation of soils in considerable detail, and the nature of the different substances. The popular adage that "a limestone country is a rich country" is one which cultivators on chalky and lime stone soils do not frequently agree with, as such soils are usually regarded as hungry ones. However, reasons are given in justification of the popular idea. The discussion of the action of bacteria in soils occupies many pages.

To English readers the work will appear to go very thoroughly into the study of soil physics, because this branch of allied science has been, and still is, very greatly neglected in this country. If organisers of horticultural education realised that a knowledge of applied physics is at least equally important to a knowledge of biology or chemistry in enabling cultivators to render their plants healthy and self-resistant to disease, this book would be found absolutely indispensable at least for the teacher, the advanced student, and the more-educated practitioner, farmer, or gardener.

The chapters on the recognition of the character of soil from their native vegetation supply the reader with information upon a subject which has been too long neglected in this country.

The work must necessarily find a niche in many libraries besides those of agricultural and horticultural institutions. In all libraries of such institutions the authorities should see that there is at least one copy. Of necessity highly technical, it is for the most part beyond the comprehension of the average cultivator. It is a book for the educated person who, having digested the facts, may in turn interest and profitably instruct those who are unable to appreciate the feast of knowledge here set out.

"A Book of English Gardens." By M. R. Gloag, illustrated by K. M. Wyatt. 8vo. 340 pp. (Methuen, London.) 10s. 6d. net.

This book will repay the careful reader, and to describe individually the gardens of several of the great houses of England was a happy idea, and one that has not been overdone. In the description of Ashridge one finds the use of coloured gravel in decoration denounced by Lord Bacon in no measured terms: "As for the making of knots or figures with divers coloured earths that they may lie under the windows of the house on the side, which the garden stands, they be but toys—you may see as good sight many times in tarts." It is also at Ashridge that we read of a lavender and herb garden: "A lavender garden, what a delight. It is a simple herb, but beloved by all, and by none more than the old garden writers. A delicious fragrance lingers in a herb garden, one which seems to exist nowhere else and is never enervating or sickly, but always bracing, almost in fact health-giving. In these days of gorgeous blossoms few people realise the subtle charm which lies in these humbler plants or how much suffering they have soothed, with faith to help their magic flowers." This must be a wonderful garden indeed, and this is really a delightful chapter.

At Knole we are introduced to another lavender garden, the "sweet-

smelling misty mauve lavender. The idea in old days of reserving one garden for one type of flower cannot be too much admired ; it gives a delicacy of effect and also the charm of individuality." It is a pity this is not more carried out to-day. In the chapter on Ham House enough is written to show that the vine was cultivated there, and that there was an English vineyard. Also at Abbotsbury and at Albury. At this latter place the vineyard was said to be twelve acres in extent. Hatfield, we are told, possessed large vineyards long before the celebrated one was planted by Sir Robert Cecil.

Those who have visited Knole may remember the quaint old rooms fragrant with the perfume from the pot-pourri jars. The old recipe of Lady Betty Germaine is given below : "Gather dry, double violets, rose leaves, lavender, myrtle flowers, verbenas, bay leaves, rosemary, balm, musk, and geranium ; pick these from the stalks and dry on paper in the sun for a day or two before putting them in a jar. This should be a large white one, one well glazed, with a close-fitting cover ; also a piece of card the exact size of the jar, which you must keep pressed down on the flowers. Keep a wooden spoon and stir the salt and flowers from the bottom before you put in a fresh layer of bay salt above and below every layer of flowers. Have ready of spices plenty of cinnamon, mace, nutmeg, and pepper and lemon peel pounded. For a jar, $\frac{1}{2}$ lb. orris-root, 1 oz. storax, 1 oz. gum benjamin, 2 oz. calaminio aromatico, 2 grs. musk, and a small quantity of oil of rhodium, the spice gums to be added when you have collected all the flowers you intend to put in. Mix all well together, press down well, and spread bay salt on the top to exclude the air until January or February following. Keep the jar in a cool place."

No doubt, there are celebrated individual plants and shrubs in these historic gardens, but not too many are mentioned, and one could have hoped to find more recipes, for which many of these noble still-rooms must be celebrated.

The original drawings by K. M. Wyatt must be charming, and their reproductions in many cases a disappointment to the artist, though some are less hard than others.

"Garden Colour" : Spring, by Mrs. C. W. Earle ; Summer, by E. V. B. ; Autumn, by Rose Kingsley ; Winter, by Hon. Vicary Gibbs ; Notes and Water-colour Sketches by Margaret Waterfield. 4to. 196 pp. (Dent, London.) 21s. net.

In this volume of beautiful print and lovely illustrations the well-known authors have compiled one of the best books on gardening that we have had the pleasure of reading. In the fifty-six pages devoted to Garden Colour in Spring Mrs. Earle, in her usual charming manner, names a large number of plants every one of which we should desire to grow had we space to give them ; but the choice is so great, the colour so varied, and the mode of culture best suited to them so plain, that we may make our selection easily by the aid of this book, without much danger of any failure. The portion by E. V. B., devoted to Summer, is equally delightful, and covers a very wide field ; while Mrs. Crofton deals with Climbing Roses, Mr. Richmond Powell with Pæonies, and Mr. George Mount with the Culture of Roses, each one treating their subject in a masterly manner.

Rose Kingsley and the Hon. Vicary Gibbs indicate very clearly what may be grown in practically every garden to make it quite as attractive in the autumn and winter as during other seasons of the year; and those who have seen the remarkably fine displays of autumn foliage, berries, plants, and also plants with coloured stems or wood from Lord Aldenham's and Major Holford's at the Royal Horticultural Shows will realise how little this phase of garden and plant adornment is understood by the great majority of us; and no admirer of autumn and winter colours or tints should miss reading this admirable portion of a perfectly charming book.

"The Vegetable Garden." By MM. Vilmorin-Andrieux, of Paris. English edition under the direction of W. Robinson. 8vo. 782 pp. (Murray, London.) 15s. net.

This standard work on Vegetables has been considerably enlarged, and is unquestionably the most complete and best work that has been published on vegetables. Every employer of a gardener would find it worth while to purchase this book and present it to him, and everyone possessing a large or small vegetable garden should obtain a copy. Not only are all our best and most popular vegetables clearly described with full and plain instructions as to how they should be cultivated, but many easily grown but rarely seen in this country are named, with complete cultural directions. The illustrations are very good and the type clear and easy to read, and we strongly recommend this excellent work to every gardener or vegetable epicure.

"Notes from Nature's Garden." By Frances A. Bardswell. 8vo. 222 pp. (Longmans, London.) 6s. 6d. net.

A delightful book, written by a careful observer of country life and scenes; even the garden cat and its habits are found to be attractive, although some of us do not recognise its claims in that direction. The authoress writes in charming style of many familiar scenes in the country, mentioning various traits or points of country life that a less keen observer passes without notice. Nor does she omit Nature in towns, including maligned London; in fact, the authoress shows how we may find natural life flowing in all directions if we care to look for it. The printing and illustrations are excellent, and we can commend this book to all admirers of country life.

"Gardening: A Guide for Amateurs in India." By W. W. Johnstone. 8vo. 287 pp. (Himalaya Seed Stores, Mussoorie.) Rs. 2.8. (3s. 4d.)

A very valuable and useful book, specially adapted for those possessing gardens in India, giving as it does the best kinds and varieties of vegetables and flowers most commonly cultivated in that hot country. Clear and concise information is supplied on the best mode of growing each kind, time of sowing, &c. We were surprised to discover that so many kinds and varieties of both vegetables and flowers, almost universally grown in Britain, are the favourites in India, which speaks volumes for their suitability for widely varying climatic conditions.

"Cassell's Popular Gardening." By W. P. Wright. 2 vols. 8vo. 576 pp. each volume. (Cassell, London.) 30s. net.

There is scarcely any subject connected with horticulture that is not touched upon in these volumes; some are dealt with fully, while others are briefly mentioned, but all are treated in lucid, forcible style, so that even a novice can grasp the meaning of each article on any subject, from crocking pots up to the management of the choicest orchids. All outdoor and indoor operations, such as fruit, flower, vegetable, herbaceous, and alpine plant culture, is plainly expounded, and bedding-out as usually understood, water-gardening, &c., all receive attention; in fact, the subjects are far too numerous to mention even briefly. The printing and illustrations are excellent, and we think this fine work would be still better if the author in the next edition could arrange for all the matter on one subject to be together, instead of being scattered about sometimes in both volumes. We would also suggest having each volume independently indexed, instead of at the end of the second volume—it would be much easier for reference.

"The Book of Market Gardening." By R. Lewis Castle. 8vo. 171 pp. (Lane, London.) 2s. 6d. net.

An extremely useful book for market gardeners, supplying much valuable information on land tenure, compensation, the most economical forms of labour, crops, methods, management, diseases, the most profitable kinds and varieties to grow, grading, packing, marketing of produce, modes of conveyance to market, assessment, rates, taxes, crop returns, values and profits, fruit-preserving, &c.—all of immense importance to the market grower, and a useful guide to those intending to commence growing for market.

"A Concise Handbook of Climbers, Twiners, and Wall Shrubs." By H. Purefoy Fitzgerald. 8vo. 152 pp. (Methuen, London.) 3s. 6d. net.

On reading this book it comes as a surprise to find that there is such a wealth of plants suitable for covering walls, fences, dead trees, &c. They are arranged in alphabetical order; the botanical and common names of each are given, their natural order, native country, time of flowering, colour, culture, &c., and the height they attain, which in most cases is rather under than over stated; that, for instance, of *Solanum jasminoides* is noted as 6 feet, but we know of a plant in Sussex reaching 25 feet high and as much across—a glorious sight when in blossom. It is a capital book, full of sound information, and worthy of a place in the library of every gardener or garden owner.

"The Book of Rarer Vegetables." By George Wythes, V.M.H., and Harry Roberts. 8vo. 109 pp. (Lane, London.) 2s. 6d. net.

Persons wishing for more variety in their vegetable diet will find this book very useful, as many things are mentioned that are seldom seen or heard of on British menus. Should there be any feeling of doubt as to how these rarer vegetables ought to be cooked, directions are supplied on this point; and how they should be served is also mentioned. Advice on the best modes of cultivation is given fully, and some plants

are named that need no cultivation, such as the nettle and the scurvy grass (*Cochlearia officinalis*), which is usually found in quantity by the sea coast. The illustrations are good and the print excellent.

"A Concise Handbook of Garden Shrubs." By B. M. Gwyn Lewis. 8vo. 196 pp. (Methuen, London.) 3s. 6d. net.

To the great multitude of garden books this is a most welcome addition, as it deals with a subject of more than ordinary interest to all garden-lovers in such a plain, instructive style that it will at once commend itself to everyone. The shrubs are dealt with in alphabetical order, so that it is very easy to find any particular plant. The natural order, the native habitat, height, colour, and time of flowering, the best methods of propagation, suitable soils, synonyms, &c., are given, all of which are full of interest. Again, mention is made as to whether the plant is hardy, the best position in which to plant it, and much other information is afforded in a most clear yet concise form. Amongst a host of good things we are glad to see *Wistaria multijuga* mentioned, of which the author says: "This fine species is distinguished by the immense length of the flower racemes, often two to three feet. There is a white-flavoured variety, *W. m. flore albo*. The length of the racemes may appear to be exaggerated, but it is correct; at the Society's Gardens, Wisley, they often attain a length of three feet; and we should plant this variety in preference to *W. chinensis*, as the flowers are the same colour, and it grows more rapidly in its early stages. In our experience the white form of *W. multijuga* is not worth growing.

"The School Garden." By J. E. Hennesey. 8vo. 155 pp. (Blackie London.) 1s. net.

An excellent little book that will be exceedingly useful to school-masters and scholars, as it teems with first-rate practical information specially adapted for them. Chapters on Soils, Drainage, Tillage, Propagation, Fruit Culture, Vegetable Culture, Salads, Flowers, Operations, Equipment of School Gardens, Books for Reference, suggested Syllabus, and a valuable Glossary are given. All the above subjects are dealt with in a most able manner.

"School Gardening." By W. E. Watkins and Arthur Sowman. 8vo. 103 pp. (Philip, London.) 2s. 6d. net.

Another book specially written for school teachers and scholars, quite distinct from the book "The School Garden." In this work a calendar of operations for every month of the year is given, with a fund of information on fruit, vegetable, and flower culture, soils, drainage, insect and fungoid pests, propagation, &c.—all of considerable value to teachers and scholars.

"My Garden." By Eden Phillpotts. 8vo. 207 pp. ("Country Life," London.) 12s. 6d. net.

A truly delightful and fascinating book beautifully printed and illustrated. From beginning to end one is charmed with the author's style. The chapters on The White Rockery, The Red Rockery, The Iris, The

Pond, and Of Many Things are specially attractive. It is difficult to fix on any part of the book being better than another, but the chapters on Irises and The White Rockery should be read by every flower-lover. We have only one fault to find with this delightful work—viz. that capital letters have not been used in the names of many plants. For instance, on p. 4, *Romneya Coulteri* is given thus, "*romneya Coulteri*"; otherwise the work is excellent and can be strongly commended to all. It is an attractive book for the drawing-room table.

"Pictorial Practical Potato Growing." By Walter P. Wright and Edward J. Castle. 8vo. 152 pp. (Cassell, London.) 1s. 6d. net.

A most useful and excellent little book well illustrated and indexed. After giving the history of the potato's introduction into Europe, the author devotes a very interesting chapter on the Deterioration of Varieties of Potatoes, followed by one on "The Benefits derived from Change of Seed," and this chapter is worthy of careful attention by large or small growers. Anyone ambitious to raise new varieties will find full instruction in the following chapters, also all the best modes of propagation are ably dealt with. As the potato is such an important national crop the preparation of the ground is treated very fully, both in the garden and field, and if growers will follow out the advice of the authors on these points, and the culture recommended afterwards, good crops of fine tubers may be confidently expected. The very important question of storage after the crop is lifted is explained so clearly that a novice can scarcely make a mistake. Frequently complaints are made that disease, insect pests, such as wire-worm &c. spoil a large proportion of the potato crop, arising no doubt, in many cases, through no proper methods being taken to destroy or check these pests. A new remedy is strongly recommended for killing insect foes—viz. "Vaporite"—which we have no personal experience of at present; but the next remedy is a well-known and thoroughly good one, and as the information is of such general interest we cannot do better than quote the authors: "Gas-lime is an old and proved remedy. It should be quite fresh, spread over the land at the rate of 4 tons per acre, $\frac{1}{2}$ cwt. per rod, and left for a month or six weeks, when it may be worked into the soil. Autumn is the best time to apply, as time is then left for the dissipation of the fumes before planting is done." Last, but not least, is an excellent chapter on How to Cook Potatoes. From the first to the last page the book teems with sound information.

"First Steps in Gardening." By Walter P. Wright and Edward J. Castle. 8vo. 152 pp. (Cassell, London.) 1s. 6d. net.

For the amateur, possessing only a small garden, this little book will be especially valuable. The forty-six chapters are too numerous to mention in detail, but they contain practically all that the amateur wishes to know: some of the principal things dealt with are early bulb-forcing, budding, grafting, propagation, pruning, fruit, flower, and vegetable culture, both under glass and in the open; manuring, watering; how to have a weedless lawn; and, for people of small means, how to have a gay garden for 2s. 6d., with full details of how to do it. It is an eminently practical book, and, we believe, will attain much popularity among amateurs.

"School and Garden." By Walter P. Wright. 104 pp. (Cassell, London.) Limp cloth, 6*d.*; cloth boards, 9*d.*

This useful reference book was written specially for schools and school teachers, and is so simple that any child can easily understand what is written, and, further, it supplies information that the teachers themselves will find extremely useful. Clear instructions are laid down for the management of small gardens, such as school gardens or allotments. Modes of cultivation; the best kinds and varieties of flowers, fruits, and vegetables to grow; descriptions of soils; insect and fungoid pests; lessons in pruning; the best tools to use; plants in pots, and window-boxes, &c. Boys who study this little book, and act strictly on the lines laid down, will attain a high position in their school examination on gardening.

"Pictorial Practical Flower Gardening." By Walter P. Wright and Edward J. Castle. 8vo. 152 pp. (Cassell, London.) 1*s.* 6*d.* net.

Another of Mr. Wright's eminently practical books; it is devoted to the laying-out of gardens, making lawns, beds, rockwork, arches, and the cultivation of hardy flowers, ferns, and water-loving plants. Trees, shrubs, and bulbs are also included, and while particularly serviceable to the owners of comparatively small gardens, it may be studied by the owners of larger places with a good deal of interest and profit. The information is very concise, clear, and reliable; the illustrations are excellent, and add materially to the practical value of the book.

"Early Lessons in Cottage Gardening." By Albert A. Kerridge, A.C.P., F.R.H.S. 8vo. 111 pp. (Paternoster Publishing Company, London.) Cloth, 2*s.* 6*d.*; paper, 1*s.*

A useful book for cottagers, containing chapters on Soils: their Nature and Composition; also information on Digging, Trenching, Manuring, &c.; also chapters on Plant Life, Hardy Garden, Flowers, Vegetables, and Fruit. We do not think the author is quite clear enough in the word "varieties"; for instance, he says on page 35: "The Pompon or Bouquet Dahlias are miniature varieties with double flowers, similar to the show varieties in almost every respect except size." Then, again, at page 43, he says: "There are two varieties of lettuce in cultivation, known as Cos and Cabbage Lettuces." In our opinion "types" would have been better, as there are hundreds of varieties of dahlias, and a great number of varieties of both the Cos and Cabbage types. Other chapters deal with insect and fungoid pests, and remedies for the same—all of a reliable character, although we should like to have known more on how much water to use in the following recipe, page 107: "The mixture is made by dissolving equal weights of sulphate of copper in hot water and fresh lime in cold water, mixing together when cold." This is the Bordeaux mixture, and cottagers would be puzzled as to quantities.

"The Garden Beautiful: Home Woods, Home Landscape." By W. Robinson. 8vo. 394 pp. (Murray, London.) 10*s.* 6*d.* net.

Few books on gardening have been read with so much interest, and have done so much to make our gardens natural and beautiful, as those by Mr. Robinson. This new work of his will, we hope, emphasise the

lovely effects obtainable from following out a natural method of planting, grouping, and selecting the best trees for parks and woodlands, and doing away with the ugly and artificial appearance one sees so very often in large places. Mr. Robinson's trenchant remarks on "Garden Design and Writings upon it" we strongly commend to all who intend remodeling or making a new garden, and also the next chapter on "So-called Styles and some Common Mistakes." All who admire the truly artistic and beautiful will be in full accord with Mr. Robinson. The chapters on Trees and Shrubs, and Climbers, and their artistic use, are such as are much needed at the present time, when so many things are put in positions quite unsuitable. The chapters on Wood and Coverts are full of sound advice, and from an economical, ornamental, or game-preserving point of view should appeal to all estate owners. The chapters on Herbaceous, Alpine, Bog, Water, Lawns, Orchards, &c. are all of the highest value, and equally as interesting as the other portions of the book; but, without exception, we can strongly advise all lovers of gardening to "read, mark, learn, and inwardly digest" the whole of the contents of this beautifully "got-up" book.

"Another Hardy Garden Book." By Helena Rutherford Ely. 8vo. 243 pp. (Macmillan, New York and London.) 7s. 6d. net.

This book is beautifully got up; the printing and illustrations are excellent. The book contains a great deal of very interesting reading; but, as it is all matter relating to horticulture in America, a good deal of the advice and practice would not be suitable for Britain. Again, we are afraid most planters would be disappointed if they expected their trees to make such rapid growth as those mentioned by the author. At the same time there is much to be learned from this book on the artistic grouping of plants, trees, and also the arranging of cut flowers. The plan of having bold clumps in the garden of one kind of variety, and only one kind or variety in a vase of cut flowers, is strongly advocated; happily this style of arrangement is now popular in this country. A useful addition to the now almost numberless books on gardening.

"The Book of Cut Flowers." By R. P. Brotherston. 8vo. 299 pp. (Foulis, London.) 3s. 6d. net.

In describing this book the author adds to the title "A Complete Guide to the Preparing, Arranging, and Preserving of Flowers for Decorative Purposes." A title well deserved, as it is the best work we have seen on the subject, and one that was much needed. How very, very often we have been asked if we could name and recommend a book on the arrangement of flowers, and had to reply we could not do so! In this work a mass of interesting and valuable information is given on all kinds of floral decorations in the best taste, and we strongly recommend it to all who have anything to do with floral arrangements.

"The Book of the Winter Garden." By D. S. Fish. 8vo. 107 pp. (Lane, London.) 2s. 6d. net.

A most interesting book dealing with a very important subject, viz. the supply of cut flowers and ornamental plants through the winter

months. The best winter-berried trees and shrubs are mentioned first, and well described, followed by winter-flowering trees and shrubs, and those with coloured stems have not been forgotten. Owners of small gardens with no glass-houses will find much to interest them in the above, and those with large places will find it equally as valuable for the information given by which they may enhance the ornamental parts of the park or garden in winter. There are many other notes on herbaceous and hard-wooded plants, winter bedding, &c., all of interest, followed by plants under glass, bulbs, forced plants, &c., proving how a good supply of flowers may be had all winter, providing there is the necessary accommodation. The printing and style of the book are excellent, and we can confidently recommend this book to all lovers of gardening.

"Flowers and Fruit for the Home." By J. L. Richmond, F.R.H.S. 8vo. 247 pp. (Morton, Edinburgh; Simpkin, London.) 5s. net.

Another excellent book, the major part of which is devoted to flowers and the remainder to fruit. The printing and illustrations are very good, and out of the mass of information it is difficult to individualise in any one feature; but the chapter on water-gardens is very useful, as so many are now taking up this fascinating form of gardening; and, though by no means are all the plants mentioned that can be used for this purpose, most of the best are recommended. Flowers, both under glass and in the open, are dealt with in a pleasing and concise manner. And fruits also are treated on in the same able practical style.

"Variation, Heredity, and Evolution." By R. H. Lock, M.A. 8vo. 299 pp. (John Murray, London.) Cloth, 7s. 6d. net.

So rapid has been the progress in our knowledge of the transmission of characters from parent to offspring since Mendel's laws were rediscovered, and his paper unearthed, that it is well now and then to pause and pass in review the theories of evolution which have been brought forward in the past in the light of present-day researches. The present volume is such a review, written by one of that active school of experimenters who have made their home at Cambridge, and whose aim is to investigate the laws of inheritance; and an interesting and lucid account of "Recent Progress in the Study of Variation, Heredity, and Evolution," as the title-page has it, has been produced. The observation of the variations that occur among living organisms led to the development of the theory of evolution; but, as the author points out, much ink has been spilt since the publication of Darwin's "Origin of Species" on theoretical considerations and matters of opinion. Experimental methods of investigations, on which Darwin set great store, were laid aside in order that lengthy controversies might be entered upon, and only recently has the question been lifted out of the groping darkness of abstruse theorising into the fierce light of careful experiment. Quoting Bateson, the author says the problem to be faced is: "How have . . . species been brought into existence, and how is it they are adapted" to fit the places they have to live in? He then passes in review the various theories that have been brought forward to account for the method of

origin of specific differences, dealing particularly with the Lamarckian theory which assumes the hereditary transmission of the effect of the use or the disuse of an organ brought about in response to a changed environment and the consequent accumulation of differences; the Neo-Darwinian theory, which, observing the fact that no two members of a family are ever quite alike, concludes that the struggle for existence which undoubtedly occurs will eliminate those least adapted to their surroundings, and finally result in the development of forms fitting into the various existing environments; and the de Vriesian theory, which concludes that new species have principally arisen by the help of variations which have occurred as sudden marked differences. Then follows a chapter on biometry, a difficult subject dealt with for the most part in a clear manner. The theory of mutation is explained, and an account of the work of the older hybridists Kolreuter, Knight, and Dean Herbert precedes the long section on Mendelism. Mendel's laws are plainly stated, and their bearing on many points fully discussed. The book is well printed, amply illustrated, contains a good index and a glossary of technical terms, and is altogether one that can be confidently recommended to all desiring a good summary of recent research into the facts of variation and heredity.

"New Creations in Plant Life." By W. S. Harwood. 8vo. pp. 368. (The Macmillan Co., New York.) Cloth, 6s. net.

The title-page states that this is "An Authoritative Account of the Life and Work of Luther Burbank." The author, who is an intense admirer of Burbank, traces the course of his hero's life and work with all the ardour of the true hero-worshipper, and without the exercise of that critical faculty which should be used by every biographer who wishes to paint a true picture of his subject. The book does not help at all, as we had hoped it would, to enable us to sift the truth from the obviously exaggerated accounts which have from time to time found their way into the horticultural and popular press. Burbank is placed on a solitary pedestal, and the work of those who have been content to call their results "improvements" and not "creations" is completely ignored, and yet some are even now among us. Furthermore, the book teems with inaccuracies. It is stated (p. 87) that "recent reports from Ireland show that the Burbank potato bids fair to redeem that long-distressed island from famine." After extended inquiries we are unable to learn that the "Burbank" potato is even known in Ireland. Surely, when the author says (p. 95) Burbank aims at producing a potato with a larger amount of "sugar" starch is meant. When dealing with questions of vegetable physiology the author is no more at home, for he states (p. 62) that the leaves of trees obtain nitrogen from the air. Perhaps the book, which is written in the style of a magazine article, will bring before a larger public the fact that plants are capable of improvement, and in this it will do good; but we cannot help saying that the history of Burbank's work has yet to be written, and an accurate estimate of the place he is to take among plant-breeders has yet to be made. The huge scale on which Burbank's work has been carried out is well described, and one cannot help regretting that no adequate record of the results he has obtained has been

kept. What assistance they might have been in deriving the laws of inheritance, for instance, if they could have been available for comparison with the results obtained by other workers! But with the destruction of the plants in the course of selection all record has been lost. The reiteration of the statement that Burbank has refuted Mendel's laws or overthrown one of the fundamental points of Weissmann's germ-plasm theory is not sufficiently convincing to scientific men without detailed records of the experiments on which the refutation is based. The publishers have done their work well, and the photographic illustrations reproduced on plate paper are for the most part excellent.

"A Text-book of Fungi." By George Massee. 8vo. pp. 427. (Duckworth & Co., London.) 6s. net.

The enormous advances in botanical knowledge of recent years have led to the development of text-books dealing with particular groups of plants, and the volume under review is one that will assist, with others, in displacing the advanced general text-book of botany which in late years has become so unwieldy. No up-to-date text-book on fungi in the English tongue was available, and this should meet the wants of the increasing number of those whose duty or pleasure it may be to obtain a general knowledge of this large and important group of plants. The first part of the book deals with the morphology, physiology, and biology of the fungi, accounts being given of recent work in cytological research, the structure and composition of the cell, the anatomy of the various groups, modes of reproduction, and so on, followed by interesting chapters on the liberation and distribution of spores, and a section devoted to the chemistry of the fungi, the last being probably the weakest in the book. The second part deals with fungi in their relation to the diseases of plants, and, needless to say, this part is excellent throughout, and will appeal to a larger public than the first and last portions do. In this part are included a chapter on "Biologic Forms" by Mr. Salmon, and one on "Legislation and Plant Disease," which has already appeared in the "Gardeners' Chronicle." The last and largest part gives an excellent account of the classification of the fungi.

Where most is so good it is perhaps a pity to find fault, but some parts of the book contain rather more than the usual numbers of orthographical errors, and the student is not helped by the citation of the same form under two different names, as occurs more than once; e.g. *Amanita muscaria* is written on p. 168 and under fig. 3 (5), p. 20; while on pp. 19 and 163 and under fig. 5 (3) the same fungus appears as *Agaricus muscarius*. Again, a fungus is illustrated as *Tilletia tritici* at fig. 6, p. 30; while on p. 320 the same figure appears over the name *T. caries*. Again, the term "hydrocarbon" frequently occurs when "carbohydrate" is intended.

The publication of this book gave a good opportunity for introducing a more definite nomenclature for the various forms of reproductive bodies met with in the fungi, but we find on p. 30 "one of the secondary spores has produced a *sporidiolum*," while on p. 320 the same structure is called a *conidium*. Though these and similar things detract somewhat from the value of the book, yet the whole is so excellent that no student

of botany can afford to be without it. The book is well and copiously illustrated by a large number of excellent figures, many of which, however, do duty twice in the book. Two indexes are given—one of the figures and one general. They appear to have been carefully compiled, though it is a little difficult to discover what rule was followed in selecting the names of fungi to appear in the general index.

"The Book of the Rothamsted Experiments." By A. D. Hall. Large 8vo. 294 pp. (John Murray, London.) 10s. 6d. net.

Although perhaps of more interest to the agriculturist than to the grower of garden crops—since it deals mainly with experiments on such crops as wheat, barley, clover, and hay—yet no one who is interested in the cultivation of the soil can afford to be ignorant of the results of the numberless experiments of which this book gives an account. The series of experiments which Sir John Lawes and Sir Joseph Gilbert started and carried out through sixty years at Rothamsted have gained a world-wide reputation and inspired the prosecution of similar experiments wherever agriculture is regarded as of serious importance. The author, who is now Director of the Rothamsted Experiment Station, has given to the world an excellent general view of the experiments and their results, and has pointed out, as he is so well qualified to do, the practical lessons which are to be learned from these results, so that both the student of agricultural science and the practical man will each find here matter of the greatest importance.

The object of these experiments was, as the writer points out, to obtain accurate knowledge of how the various plants obtain their nutrition, and not to see whether such and such a manure pays: and this object has been kept in view throughout the long period over which these experiments were spread, with the necessary consequence that the experiments are of value for all time and in every place—not only for the time and place where the conditions are similar to those under which the experiments were carried out. Here are to be found accounts of the experiments on the source from which plants derive their nitrogen—a question on which the views of scientific men have undergone such a change since the initiation of these experiments in 1843. A review of the meteorological observations and of the composition of the Rothamsted soil follows, both of which are necessary for a correct interpretation of the results of the numerous experiments. Then come detailed accounts of the experiments on wheat, barley, oats, root-crops, leguminous crops, hay, the nature of the herbage in the fields under different systems of manuring, and an account of the various rotation experiments, especially as far as the effect of the manurial residues on subsequent crops goes, and so on. Chapter XI. returns to the question of the supply of nitrogen to the plant from the soil and deals with nitrification, a subject upon which much still remains to be discovered. The final chapters deal with questions concerning the nutrition of animals and with such subjects as sewage, irrigation, malting, ensilage, and wheat composition.

The value of the work is enhanced by the thirty-seven diagrams and fourteen plates, including portraits of Messrs. Lawes and Gilbert, together with obituary notices by Professor Warrington reprinted from those of

the Royal Society. Appendices give a list of the publications of the Station and of the past and present workers there. The binding, paper, and print leave nothing to be desired.

"Pictorial Practical Carnation Growing." By Walter P. Wright. 8vo. 152 pp. (Cassell, London.) Paper, 1s. net; cloth, 1s. 6d. net.

There are many books on the carnation, evidence doubtless of the esteem in which this garden favourite is held. The book under review is unique in its numerous illustrations, which show every detail of culture, cross-fertilising, raising from seed, propagation by slips and layers, with every detail illustrated, and also descriptive letterpress. There is an excellent introductory chapter on carnations, past and present. It is stated that the past of the carnations comprised principally flakes, bizarres, and white-ground picotees. These are still grown and valued for their sweetness and refined beauty in most gardens, but not to the same extent as the self-coloured border carnations and yellow-ground picotees. Masses of colour can be produced by planting beds of one self-coloured variety: they make a grand feature in any garden, and can be examined closely as well as being effective at a distance. Chapter II. treats of cross-fertilisation, and this is not only well illustrated by drawings of the different parts of fructification, but the entire process is carefully described. Chapter III. deals with raising from seed. Not many amateurs would save their own seed, as in most seasons it requires the aid of a greenhouse to ripen the seed-pods. Many of the best-named carnations will not produce seed under any conditions, and it really requires expert knowledge as to the selection of both seed and pollen-bearers, as not only is it necessary that good-formed flowers, and of the colour desiderated, should be obtained, but also a vigorous plant of good, sturdy habit. It is necessary that the seed-bearers should possess vigorous constitution, better also the pollen-bearers. The author well says: "The more nearly a flower approaches to perfect doubleness the fewer reproductive organs it has, and that means little or no seed." All the details of pricking out the seedlings and growing the plants forward to the flowering stage are given in full. Illustrations of the plants set out in the beds are given, so that the merest tyro cannot go wrong.

Propagation of the named varieties by pipings and layering is also described and illustrated.

Chapter VI. is devoted to garden culture as distinct from cultivating the plants in pots. Not only are all the details described, but sets of illustrations are given showing the preparation of the ground by draining and the method of bastard trenching as distinct from ordinary trenching. Chapter VII. is devoted to the culture in pots for the home-stage and also for exhibition, with all the details of culture and method of exhibiting fully illustrated.

Full details are also given of the culture of the Malmaison and tree carnation, with chapters on diseases and insect pests. Even space is found for the Marguerite carnations and the allied favourites the garden pinks—the latter the most charming and sweetest of garden flowers, hardy everywhere and of the easiest culture. This excellent handbook

can be most highly recommended. It is not a pretentious book, but it contains just what is required for the cultivation of the carnation of every class. Every young gardener and budding amateur should possess the book. I have noted two fallacies only. There is a section on "pod-bursting." The pod contains the seed—it is the calyx that bursts. It is also stated that carnation rust is apparently powerless to attack plants out of doors; such plants, however, are liable to be attacked.

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- ADDY, BROUGHTON, M.D., Weybridge. Seeds and seedlings of *Velltheimia viridiflora*. Growing in the Gardens.
- ALLEN, R., Ashbourne, Derby. Eyes of vine 'White Nice.' Vines raised and planted in the collection.
- ANDREWS, G., Congleton, Cheshire. Seed potatoes. See p. 343.
- ASHTON, BEN, Ormskirk, Lancashire. Seed potatoes. See p. 343.
- ATKINSON, W., Bournemouth. Tomato seed. See p. 348.
- AYRES, C., Cape Town. *Richardia Rehmanni*. Growing in the Gardens. This distinct and comparatively new *Richardia* proved rather disappointing, the spathe being small, creamy white, blotched within at the base with purple.
- BACKHOUSE, J., & Sons, Ltd., York. *Saxifraga oppositifolia coccinea* and *Primula marginata* Linda Pope. Planted on the rockery.
- BARBEY, M., Valleyres, Vaud, Switzerland. Seeds of *Prunus Laurocerasus* var. *laurifolius*. Seeds and plants will be distributed to Fellows.
- BARR & SONS, Covent Garden, W.C. Collections of *Iris*, *Pæonia*, *Papaver*, *Narcissus*, &c. Planted in the Gardens. Varieties of aster, cucumber, kale, potato (see p. 341), and sweet pea for trial. The trial of asters will be continued.
- BATES, HENRY, Robertsbridge. Seed potatoes. See p. 345.
- BECKETT, E., Aldenham House, Elstree. Varieties of aster and cucumber for trial (see vol. xxxi. p. 247). The trial of asters will be continued.
- BEDDOME, Col., West Hill, Putney. Plants of *Billbergia nutans*. Distributed to Fellows.
- BELL & BIEBERSTEDT, Leith. Varieties of culinary pea for trial. See p. 333.
- BENNETT-POË, J. T., Holmwood, Cheshunt. *Nephrolepis Duffii* (plants), *Nicotiana Sanderae* (seed). Stocks raised and distributed to Fellows.
- BENTLEY, J., Ltd., Chemical Works, Hull. Insecticides. See p. 350.
- BERKELEY, MRS. G. F., Fleet, Hants. Seeds of *Eschscholtzias*. Will be tried in 1907.
- BILNEY, W. A., Weybridge. Collections of alpine and orchids. Growing in the Gardens and in part distributed to Fellows. Seeds of poppies from China. Valueless.
- BLACK, MRS. J. STUART, Ditton Hill, Surbiton. *Crinum* sp. Growing in the Gardens.
- BLACKMORE & LANGDON, Bath. Carnation for trial. See vol. xxi. p. 226.
- BONAVIA, Dr., Westwood, Worthing. Bulbils of *Lilium sulphureum*, and plants of Sylhet orange—growing in the Gardens; Vines Cornichon Blanc and Violet—planted in the collection; Miscellaneous seeds—plants raised and distributed to Fellows.
- BOVILL, A., Puerto de la Cruz, Tenerife. Bulbs of *Lilium Harrisii*. Growing in the Gardens.
- BOWLES, E. A., Myddelton House, Waltham Cross. Collections of alpine and herbaceous plants. Growing in the Gardens.
- BOYCE, J. W., Welney, Wisbech. Seed potatoes. See p. 343.
- BROWN, C. W., St. Brelade's, Jersey. Tomato seed. See p. 348.
- BULTEEL, MRS. G., Brook Lodge, Cheapside, Ascot. *Psoralea pinnata*.
- BUNYARD, G., & Co., Royal Nurseries, Maidstone. *Helianthemums* and orchids. Growing in the Garden, and in part distributed to Fellows.
- BURKILL, A. R., Twyford, Berks. Seeds of melons from Afghanistan. See p. 332.
- CANNELL & SONS, Swanley. Collection of cannas. The trial will be reported on in 1907.
- CANT, B. R., & Sons, Old Rose Gardens, Colchester. Collection of roses, planted in the Gardens.
- CANT, FRANK, Braiswick Rose Gardens, Colchester. Collection of roses, planted in the Gardens.
- CARPENTER, G., West Hall, Byfleet. Dahlias.
- CARTERS, High Holborn. Vegetable and flower seeds for trial; pea (see p. 333), potato (see p. 342), bean, cucumber, kale, carrots (see p. 331), &c.; candytuft and miscellaneous flowers.
- CHARRINGTON, MRS., The Warren, Hever, Kent. Seeds of *Casuarina* spp., &c. Plants distributed to Fellows.
- CHATFIELD, J. & F., Southwick, Sussex. Seed potatoes. See p. 347.

- CHITTENDEN, F. J., Biological Laboratory, Chelmsford. Seeds of *Castanospermum australe*.
- CLARKE, T., Deepcar, near Sheffield. Seed potatoes.
- CLEMENT-SMITH, Rev. P., St. Andrew's Rectory, Doctors' Commons, E.C. Seeds and plants from Portugal and Cape Town. In part growing in the Gardens and in part distributed to Fellows.
- COATES, G., Rugby. Bulbs and corms from Sicily. Growing in the Gardens.
- COLLIS, F., Bollo Lane, Chiswick. Rhubarb 'Collis Ruby.' Planted in the collection.
- COLMAN, JEREMIAH, Reigate. Crotons in variety.
- CONRAD & JONES Co., West Grove, Pa., U.S.A. Collection of cannas will be reported upon in 1907.
- COOKSON, NORMAN, Wylam. *Hippevallota oakwoodensis*.
- COOLING & SON, Bath. Collection of roses, planted in the Gardens.
- CORNWALL, D. J., Warwick Gardens, Worthing. Patent fruit-baskets. See p. 350.
- COULSON, J., Hexham. Seed potatoes.
- CRIPPS, THOS., & SONS, LTD. Collection of ornamental trees and shrubs. Planted in the Gardens.
- DAMMANN & Co., San Giovanni a Teduccio, Naples. Collection of cannas. Will be reported upon in 1907.
- DAVIES, J. H., Ashfield, Ross-on-Wye. Asters for trial. Will be reported upon in 1907.
- DAWSON, CHAS., Gulval, Penzance. Narcissi in variety. Planted in the Gardens.
- DEAL, W., Kelvedon, Essex. Peas (see p. 340), beans (see p. 330), and potatoes for trial. See p. 343.
- DE LUCA, M., Bromley. Miscellaneous vegetable seeds from Naples. See p. 331.
- DE LUZY FRÈRES, Lilford Road, Camberwell. Ideal powder bellows. See p. 350.
- DEVENISH, M., Addington Park, Croydon. Collection of vines. Planted in the Vineyard at Wisley.
- DE VISMES KANE, W. F., Monaghan, Ireland. *Adesmia* sp. Growing in the Gardens.
- DICKS, S. B., Fox Hill, Upper Norwood, S.E. Collection of seeds from Cairo, Rhodesia, East Africa, &c. In part growing in the Gardens and in part distributed to Fellows.
- DICKSON, A., Newtownards. Collection of roses. Planted in the Gardens.
- DICKSONS, Chester. Collection of roses. Planted in the Gardens.
- DIMMOCK, A., Craven House, Kingsway, W.C. A fine collection of Canadian hybrid gladioli. Will be again planted in the Gardens in 1907.
- DOBBIE & Co., Marks Tey and Rothesay. Collections of cucumbers (see vol. xxxi. p. 246), kales, peas (p. 336), and potatoes (p. 342); asters and cannas (will be reported on in 1907); dahlias (p. 325); and of fuchsias, pelargoniums, and violas, growing in the Gardens. Books on the Dahlia and Viola added to the Students' Library at Wisley.
- DONOUGHMORE, Dowager Countess of, 84 Sloane Street, S.W. Seeds from Jerusalem. Grown in the Gardens.
- DOUGLAS, J., V.M.H., Bookham. Collection of pinks. Planted in the Gardens.
- DU CANE, Lady, Witham, Essex. A white orchis. Planted in the Gardens.
- DUNFORD, G., Twickenham. Lawn brooms. See p. 350.
- EDINBURGH, Royal Botanic Gardens. Collection of seeds. Plants raised and distributed to Fellows.
- FAWCETT, W., Hope Gardens, Kingston, Jamaica. Seeds of *Rubus racemosus*. Will be grown in the Gardens.
- FISHER, SON, SIBRAY, Handsworth, Sheffield. Collection of hollies. Planted in the Gardens.
- FLETCHER, H., Annesley. Runner bean. See p. 330.
- FORBES, J., Hawick. Miscellaneous flower seeds for trial.
- FORTESCUE, Lady, South Molton. A collection of bog plants. Growing in the Gardens.
- FRENCH, GEORGE, Ringles Cross, Uckfield. Seed potatoes. See p. 343.
- FROEBEL, OTTO, Zürich. A collection of cannas for trial. Will be reported upon in 1907.
- GAUNTLETT & Co., V. N., Redruth. *Eucalyptus cordata*. Planted in the Gardens.
- GILBERT & SON, Dyke, Bourne, Lincs. Anemones 'King of Scarlets' and 'Queen of Roses.' Planted in the Gardens.
- GRAY, MISS MARY, Houghton-le-Spring. A packet of unnamed seeds. Plants growing in the Gardens.
- GROVE, A., Kentons, Henley. Six bulbs of *Lilium Glehni*. Planted in the Gardens.
- GULLIVER, J. W., Penarth. Californian pipless grape. Planted in the collection.
- HALES, W., Curator of the Chelsea Physic Garden. A collection of seeds. Plants raised and distributed to Fellows.
- HARRIS, JAMES, Blackpill Nurseries, Swansea. Seed potatoes. See p. 347.

- HARRISON & SONS, Leicester. Tomato seed. See p. 348.
- HARTLAND, W. B., & SONS, Cork. Seed potatoes. See p. 341. Collection of tulips. Will be reported on in 1907.
- HAYNES, H., South Heath, Hampstead. Iris bulbs from Morocco. Planted in the Gardens.
- HENDERSON, G., Otford, Kent. Seed potatoes. See p. 346.
- HENKEL, H., Darmstadt-Neuwiese. *Abies arizonica* var. *argentea*. Growing in the Gardens.
- HILL, Mrs. H. J., Send, Woking. Seeds from India. Plants growing in the Gardens.
- HOBBIES, LTD., Dereham. Roses, 'Hiawatha' and 'Philadelphia Rambler.' Added to the collection.
- HOBDAY, G., Romford. Pea seed. See p. 335.
- HOGG & ROBERTSON, Dublin. Seed potatoes (see p. 342) and borecole seed.
- HOLFORD, Major, C.I.E., C.V.O., Westonbirt, Tetbury. A collection of orchids. In part distributed to Fellows and in part growing in the Gardens.
- HOUGHTON, Mrs., Cranley Lodge, Guildford. Amaryllis bulbs. Distributed to Fellows.
- HUDSON, JAMES, V.M.H., Acton. Nymphæas and Begonias for stock. *Salvia splendens* 'Zürich.'
- HUMPHREYS, T., Curator of the Botanical and Horticultural Society, Edgbaston, Birmingham. *Bougainvillea glabra*. Plants raised and distributed to Fellows.
- HUNT, G., Auckland, New Zealand. Seed of *Olearia semidentata*.
- ILCHESTER, Countess of, Holland House, W. *Lysimachia thyrsiflora*. Planted in the Gardens.
- JACKMAN, GEORGE, Woking. Lilacs for experiment.
- JANNOCH, T., Dersingham. Collection of lilacs and lilies of the valley. Planted in the Gardens.
- JOHNSON, Mrs. E. W., Croydon. *Plumbago Larpenæ*. Planted in the Gardens.
- JONES, FRANK, Lechlade Manor, Gloucester. *Campanula Balchiniana*.
- JONES, H. J., Lewisham, S.E. Collection of asters for trial. Will be reported on in 1907.
- JONES, T., Hawkhurst, Kent. Seed potatoes. See p. 345.
- KENT & BRYDON, Darlington. Seed potatoes (see p. 346) and a collection of vegetable seeds.
- KINGSACRE NURSERIES, Ltd., Hereford. *Linaria alpina*. Planted in the Gardens.
- KINGSMILL, A., Harrow Weald. *Carpenteria*, *Skimmia*, and *Veronica*. Planted in the Gardens.
- KIRWIN, L. E., Madras. Seeds and tubers of *Antigonon*, *Gloriosa*, *Erythrina*, &c. In part growing in the Gardens, the remainder distributed to Fellows.
- KNIGHT, JOHN, Frensham. Seeds of *Phormium tenax*. Plants raised and distributed to Fellows.
- LAMOTTE, W. H., Shirley, Croydon. Clap clip for trial. See p. 350.
- LANDRETH SEED Co., Bristol, Pa., U.S.A. Seeds of tomatoes for trial. See p. 348.
- LANDSELL, J., Worcester. Tomato seed. See p. 348.
- LAXTON BROS., Bedford. Peas for trial. See p. 334. A collection of strawberries will be reported on in 1907.
- LAWRENCE, MISS, Burford, Dorking. White gentianella. Planted in the Gardens.
- LAWRENCE, Sir TREVOR, Bart., Burford. Collections of orchids and flower seeds. Growing in the Gardens and in part distributed to Fellows. "The Garden," 1888 to 1905 inclusive, added to the Library at Wisley.
- LINN, H., Hanover. Insecticide and fungicide. See p. 350.
- LISTER, J. H. M., Chief Conservator of Forests, Cape Town. Seeds of South African trees and shrubs. Plants will be distributed to Fellows.
- LOYD, Rev. P. R., Holt, Norfolk. Tomato seed. See p. 348.
- LOVELOCK, GEORGE, Grove Road, Hereford. Pea for trial. See p. 339.
- LUSHINGTON, Lady, Great Bedwyn, Wilts. Collection of alpine, planted on the rockery.
- LYNCH, R. IRWIN, Cambridge Botanic Garden. Collection of seeds. Plants raised and distributed to Fellows.
- MCINDOE, J., Dartford. Seeds of New Zealand shrubs. Plants raised and distributed to Fellows.
- MARTINEAU, Mrs. PHILIP, Twyford. Vine 'Niagara,' added to the collection.
- MASON, Miss, Vincent Square Mansions, S.W. Seeds and plants of Swiss anemones. Growing in the Gardens.
- MASSEY, G., & SONS, Spalding. Seed potatoes and peas for trial. See pp. 342 and 337.
- MASTERS, Dr., Ealing, W. Seeds of *Allamanda*, *Brunfelsia*, *Calodendron*, &c. Plants will be distributed to Fellows.
- MEREDITH, THOMAS, Newport, Salop. Scented pelargoniums. Growing in the Gardens.

- MILLER, G. W., Clarkson Nurseries, Wisbech. Begonia 'Royalty.' A richly coloured and vigorous variety. Growing in the Gardens.
- MORTIMER, S., Rowledge, Farnham. Cucumber seed for trial. See vol. xxxi. p. 246.
- MOSS, J. S., Bishops Waltham. Collection of orchids. Growing in the Gardens.
- MOUNT, G., Canterbury. A collection of roses. Planted in the Gardens.
- NAPIER, HON. MRS. MARK, Puttenden Manor, Lingfield, Surrey. *Thunbergia laurifolia*. A vigorous and very beautiful autumn-flowering stove-climber. Growing in the Gardens.
- NEWHAM, Major, Kasauli, Punjab. Tubers and bulbs from Northern India. Growing in the Gardens.
- NORTHCLEFFE, Lady, Sutton Place, Guildford. Seeds of *Meconopsis racemosa* and a collection of herbaceous plants. Growing in the Gardens.
- NORTHOVER, W., Stanhope Road, Highgate. Swiss beans for trial. See p. 330. Seeds of *Aster*, *Iris*, *Leontopodium*, and *Potentilla*. Plants raised and growing in the Gardens and distributed to Fellows.
- NOTCUTT, R. C., Woodbridge. *Cytisus nigricans*. Planted in the Gardens.
- ONION, J. W., Sidmouth, Devon. Seed potatoes.
- ONSLow, Lord, Clandon Park, Guildford. Collection of herbaceous plants. Growing in the Gardens.
- ONSLow, Miss, Send, Surrey. An unnamed Australian plant, &c. Growing in the Gardens.
- PAINE, CHARLES, Haverstock Hill, N.W. Tea seed from Calcutta. Plants raised and distributed to Fellows.
- PAUL, G., Cheshunt. Collection of roses. Planted in the Gardens.
- PAUL, W., Waltham Cross. Collection of roses. Planted in the Gardens.
- PEARSON & SONS, Lowdham, Notts. Vine 'Diamant-Traube,' added to the collection; rose, paradise, and quince stocks for the Students' Garden at Wisley.
- PERRY, AMOS, Winchmore Hill, N. *Phlox Laphami*, Perry's variety. Planted in the Gardens.
- PEITZER, W., Stuttgart. Collections of gladioli, verbenas, and cannas. The cannas will be reported on in 1907.
- PHILLIPSON, R. H., Bolton, Lancashire. Tomato seed for trial. See p. 348.
- PINCHES, John, Camberwell. Acme labels for fruit trees.
- PINCHES, R., Camberwell. Liquid sulphur mildew cure. See p. 350.
- PIRIE, Miss, Ripley, Surrey. Plants for the Gardens.
- POCOCK, R., Southover Grange, Lewes. Tomato seed for trial. See p. 348.
- POTTEN, E., Camden Nurseries, Cranbrook. *Trollius europæus*, Potten's variety. Planted in the Gardens.
- RANI YADLAL, Atrah, India. Indian seeds. Plants growing in the Gardens; will be in part distributed to Fellows.
- RASCHEN, H. H., Sidecup. Beans for trial. See p. 330.
- REUTHE, G., Keston. *Crocus sativus*. Planted in the Gardens.
- RICKETTS, G. H. M., Foulis Court, Eastleigh. Mango seeds. Plants raised and growing in the Gardens.
- RIDGEWELL, J. H., Histon, Cambs. Seed potatoes. See p. 343. Seed of cabbage and Brussels sprouts. Will be reported on in 1907.
- ROBINSON, Miss H. G., Stonehouse, Glos. *Gloxinia tubiflora*. Growing in the Gardens.
- ROSS, C., Welford Park, Newbury. Seed potatoes. See p. 344.
- ROSS, Lieut.-Col. Sir JOHN, Rostrevor, Ireland. Seeds of *Callitris oblonga* and *Eucryphia pinnatifolia*. Plants will be distributed to Fellows.
- ROTHSCHILD, Right Hon. Lord, Tring. Collection of seedling Hippeastrums. Growing in the Gardens and distributed to Fellows.
- ROUPELL, W., Roupell Park, S.W. Eyes of Vine 'Diamant-Traube.' Vines raised and added to the collection.
- ROW, W. NORTH, Cove, Devon. *Datura 'Cornucopia'*, *Nicandra physaloides*, and *Pelargonium 'Achievement'*.
- RUSSELL, L. R., Richmond. *Ribes speciosum*. Planted in the Gardens.
- SANDEMAN, Col. J. G., Hayling Island. Seeds of *Cryptomeria*, *Eucalyptus*, *Phillyrea*, &c., and plants from Punta Arenas. Growing in the Gardens. Seedlings will be distributed to Fellows.
- SANDEMAN, Mrs. C. S., Broughty Ferry, N.B. Bush-threader. See p. 350.
- SATOW, S. A. M., Berkhamsted. Aster, marigold, and lettuce seeds from Peking.
- SCARLETT, T. A., Market Street, Edinburgh. Seed potatoes. See p. 346.
- SCHRÖDER, Baron, The Dell, Englefield Green. Leaves of the best named varieties of Rex begonias, from which a stock has been raised for distribution to Fellows.
- SCRASE-DICKENS, C., Coolhurst, Horsham. *Dierama pendula* and a collection of early-flowering gladioli. Planted in the Gardens.

- SHARPE, C., & Co., Ltd., Sleaford. Borecole, cucumber (vol. xxxi. p. 245), and pea seed for trial. See p. 340.
- SHEPHERD, V., Oxted, Surrey. *Helxine Soleirolii*, *Mackaya bella*, &c. Distributed to Fellows.
- SLINGSBY, H. T., Thorpe Underwood, York. *Mutisia decurrens*. Planted in the Gardens.
- SMITH, J., Thornhill, East Grinstead. *Habenaria bifolia*. Planted in the Gardens.
- SMITH, R., & Co., Worcester. A collection of trees and shrubs. Planted in the Gardens.
- SMYTH, W., Holywood, co. Down. *Cytisus*, *Clanthus*, *Phormium* seed. Plants raised and distributed to Fellows.
- SPEER, Capt. A. E., Sandown Lodge, Esher. Seeds from Rhodesia. Growing in the Gardens.
- SPOONER & SONS, Hounslow. Collection of roses. Growing in the Gardens.
- SPRAGGE, Lieut.-Col., D.S.O., Brandon, Suffolk. Scented rush. Planted in the Gardens.
- STANARD, R., Loseley Park, Guildford. Broccoli, cucumber, and pea seed (see p. 336) for trial.
- STANLEY & Co., Ltd., Garlick Hill, E.C. Slugdeath. See p. 351.
- STOKES, T., Baughurst, Basingstoke. *Tibouchina semidecandra*. Growing in the Gardens.
- STOKES, W. J., & Son, Hilperton Marsh, Trowbridge. Seed potatoes. See p. 344.
- SUTTON & SONS, Reading. Collections of cucumbers, kales, and peas for trial. See p. 333.
- SYDENHAM, R., Birmingham. Cucumbers, peas, potatoes (see p. 344), tomatoes (see p. 349), and sweet peas for trial. Barberton Daisy and White Watsonias. Growing in the Gardens. *Schizanthus wisetonensis*, a very good strain of this showy variety.
- TABER, COOPER & Co., Ltd., Southwark Street, S.E. Seed potatoes. See p. 345.
- TABOR & Co., Basinghall Avenue, E.C. Fertiliser. See p. 350.
- TAYLOR & THOMSON, Stevenage, Herts. Seed potatoes. See p. 347.
- THOMAS, R. S., Exmouth, Devon. Miscellaneous seeds from Madagascar. Plants growing in the Gardens.
- THORNYCROFT, Mrs., Siddington, Crewe. Seedlings from Hong Kong and Barberton. Growing in the Gardens.
- THORNYCROFT, Sir JOHN, Bembridge, Isle of Wight. Rose 'Dorothy Perkins.' Planted in the collection.
- THURLOW, Major, Uckfield, Sussex. Two blue Nymphæas and cuttings of Lotus and Mesembryanthemums. Growing in the Gardens. Plants raised will be distributed to Fellows.
- TIMOTHY & SANDWICH, Bracknell. Paraffin soap. See p. 350.
- TOD, H. M., & Son, Seething Lane, E.C. A collection of the best outdoor vines. Planted in the vineyard at Wisley.
- TRAHERNE, Capt. G. C., Cardiff. *Eccremocarpus*, *Primula*, &c. seedlings. Growing in the Gardens, in part distributed to Fellows.
- TRESEDER & Co., Truro. *Eucalyptus Beauchampiana*. Planted in the Gardens.
- TRESEDER, W., Cardiff. Treseder's Cabbage.
- TURNBULL, T. S., St. Anne's-on-the-Sea. Carnation cuttings and *Hippeastrum* seedlings. Stocks raised and distributed to Fellows.
- UPTON, A. R., Guildford Hardy Plant Nursery. A collection of alpiners. Planted on rockery.
- USHERWOOD, T. E., Wareham. Seeds from South Africa and Natal. Plants raised and distributed to Fellows.
- VEITCH, JAS., & SONS, Chelsea. Seeds of borecole, cucumber (see vol. xxxi. p. 246), pea (see p. 333), potato (see p. 342), and sweet pea (see vol. xxi. p. 237) for trial. Collection of cannas will be reported on in 1907. Liliiums and miscellaneous flowering plants, growing in the Gardens. A valuable collection of books, added to the Students' Library at Wisley.
- VEITCH, R., & Son, Exeter. Broccoli, pea (see p. 335), and potato seed for trial; *Calceolaria*, Veitch's hybrid planted in the Gardens.
- VOSS, W., & Co., Ltd., Millwall, E.C. Phospho-nicotyl. See p. 350.
- VULLIAMY, J., Cobham, Surrey. Strawberry props, made by the blind. See p. 351.
- WALLACE, R., & Co., Colchester. Tulips for trial. Will be reported on in 1907.
- WARD, J., Alfreton, Derby. Vine 'White Nice.' Planted in the collection.
- WARE, T. S. (1902), Ltd., Feltham. Collection of alpiners. Planted on the rockery.
- WARE, WALTER T., Ltd., Bath. Tulips for trial. Will be reported on in 1907.
- WATKINS & SIMPSON, Tavistock Street, W.C. Sweet peas for trial. See vol. xxi. p. 237.
- WATSON, D., Cromer. Miscellaneous seeds and cuttings. Plants raised will be distributed to Fellows.

- WELLESLEY, F., Westfield, Woking. Collection of orchids. Growing in the Gardens.
- WELLSON & Co., Leeds. Lawn manure. See p. 350.
- WESTERN ORCHARDS PRODUCE Co., Ltd., Cophall Avenue, E.C. Melon seeds. See p. 332.
- WETTSTEIN, Prof. Dr. R. V., Director of the Botanic Garden, Vienna. A collection of seeds. Plants raised and distributed to Fellows.
- WHITELAW, H. R., Goudhurst, Kent. Cucumber for trial. See vol. xxxi. p. 247.
- WHITELEY, H., Torquay. Apples 'Endsleigh Beauty' and 'Watcombe Hero.' Planted in the collection.
- WHITE-SPUNNER, Mrs. F. S., Shinrone, King's Co. Seeds from New Zealand. Plants raised (*Clanthus*, *Swainsonia*, *Sophora*, &c.), distributed to Fellows.
- WICKS, —, Halfway Lodge, Esher. Variegated syringas. Planted in the Gardens.
- WILKS, Rev. W., Shirley. Seeds of *Celmisia*, *Olearia*, *Veronica* spp., &c. Plants raised will be distributed to Fellows.
- WILLARD, JESSE, Highgate, N. A valuable collection of books for the Library at Wisley.
- WILLIAMS, J. C., St. Austell, Cornwall. *Cornus suecica*, *Polystichums*, *Primulas*, and *Rhododendron Boothii*. Growing in the Gardens.
- WILLIAMS, P. D., St. Keverne, Cornwall. *Rhododendron* grafts. Failed. *Caltha polypetala*. Planted in the Gardens.
- WILLIAMSON, J. F., Mallow, Co. Cork. Seed potatoes. See p. 342.
- WILLIAMSON, Mrs. M. H., Sussex Square, W. *Cypella Herberti*. Planted in the Gardens. Seedlings raised will be distributed to Fellows. South American gourds. See p. 331.
- WILLMOTT, Miss, V.M.H., Warley Place. A collection of seeds. Plants raised and distributed to Fellows.
- WILSON, A. M., Spilsby. Tulip for trial. Will be reported on in 1907.
- WOOD, J. M., Botanic Gardens, Berea, Natal. *Richardia Rehmanni*, a disappointing form with spathes of a very pale purple. Growing in the Gardens.

EXAMINATION OF MEN EMPLOYED IN PUBLIC PARKS AND GARDENS.

JANUARY 14, 1907.

THE Second Annual Examination by the Royal Horticultural Society, of the Employees in Public Parks and Gardens, was held on January 14, 1907. The object of the examination is to test as far as possible the knowledge of Public Park employees of their work, and to stimulate an intelligent observation and interest in the objects which are ever before their eyes and which their hands daily handle.

As previously, the examination was partly written and partly *vivâ voce*, occupying three hours and twenty minutes. It was held at the Society's Great Hall in Vincent Square, Westminster.

Sixty candidates entered their names, of whom 59 presented themselves for the examination.

Fifteen questions were set at the written examination, and the Council will learn with pleasure that a definite improvement is perceptible, both in the accuracy and the manner of expression of the written replies. The same advance was found in the *vivâ voce* section; but, notwithstanding these evidences of a more thorough preparation than last year, there still remains a vast field for improvement. For example, the outline drawings for a group of decorative flower-beds were as unsatisfactory in design as they were in plant arrangement, the designs being wanting in originality and with little or no departure from the conventional type. The drawings themselves also were very poor, and future candidates are strongly recommended to study the simple principles of geometrical design, to enable them to set out decorative beds, first, to scale on paper, when harmony of proportion with symmetry of outline is more easily obtainable, and, secondly, in the garden itself from the plan so prepared. Candidates will also do well to practise the writing of answers during their period of preparation for the examination, exercising themselves in a fairly rapid but intelligible handwriting. A natural fluency will thus be obtained in the written expression of thought, and more questions will accordingly be dealt with during the hours of the examination. That this is necessary is proved by the results of this year, for of the fifteen questions set, an average of nine only were even attempted. This deficiency seriously depreciates candidates' positions in the "Pass" list.

Eight of the candidates failed to obtain the number of marks required for a "Pass," although the examiners gave credit wherever possible for the evidence of good intentions.

The examiners again desire to impress on the candidates the absolute necessity of observation as they pursue their daily work, and

the application of thought as to the why and the wherefore of what they do and what they notice. A man can never be really fit for a high place in any calling in life unless he both thinks and observes. Rules are good, but only so long as they lead to the inquiry as to why in each case they should be followed, and what effect they are intended to produce. The unsuccessful candidates should not be disheartened by failure, but set themselves carefully to observe the things about them, and to think out for themselves the reasons of their different operations. Twelve months of this, coupled with inquiry from their superiors on points which seem difficult to fathom, will probably result in their success at the next or at some subsequent examination.

The Council will regret to hear that one candidate was expelled from the examination room for consulting a note-book, and his papers were consequently cancelled.

WILLIAM CRUMP,	} <i>Examiners.</i>
C. R. FIELDER,	
GEO. NICHOLSON,	
OWEN THOMAS,	
EDWARD WHITE,	
W. WILKS,	

DIVISION A.

Class I.

1. Barnes, A. G., 9 Mount Adon Park, East Dulwich.

Class II.

2. Willard, Ernest James, 1 Forest View, Forest Road, Leytonstone.
3. Western, Joseph, The Lodge, Island Gardens, Poplar, E.
4. Parrott, C., Springhill Cottage, Upper Clapton, N.E.

Class III.

5. Smith, John G., 56 Paulet Road, Camberwell, S.E.
6. Hentsch, Frederick, Rosary Lodge, Battersea Park, S.W.
7. Pogmore, Charles, 60 Bandon Road, Approach Road, N.E.
8. Hudson, James Henry, Surrey Mount, London Road, Forest Hill, S.E.

DIVISION B.

Class I.

1. Turner, Alfred Victor, 4 Victoria Grove, Morpeth Road, S. Hackney, N.E.
2. Gibson, Pierre, 34 Despard Road, Highgate Hill, N.

Class II.

3. Sheppard, Alfred Charles, 18 Glenwood Road, West Green, S. Tottenham.
4. Black, Ronald, 31 Bowerdean Street, Fulham, S.W.
4. Dixon, Frederick Charles, 10 Dairsie Road, Well Hall, Eltham.

6. Williams, Francis, 27 Ruislip Street, Tooting, S.W.
7. Spencer, Walter, 59 Rathcoole Gardens, Hornsey, N.
8. Weston, Robert James, 13 Gibbon Road, Nunhead, S.E.
9. Lewis, J. W., 10 Dairsie Road, Well Hall, Eltham.
10. Hartless, Alfred James, 40 Bismarck Road, Highgate Hill, N.
11. West, William Henry, 207 Dunstan's Road, East Dulwich, S.E.
12. { Troke, Andrew James, 7 Crewys Road, Child's Hill, N.W.
Lambert, Thomas, 4 Christie Road, South Hackney, N.E.
14. Scott, Thomas, 70 Garnham Street, Stoke Newington, N.
15. { Groom, Charles G., 32 Castle Street, Battersea, S.W.
Gray, George, 136A Grosvenor Road, Pimlico, S.W.

Class III.

17. Saunders, S. J., 23 Latchmere Road, Battersea, S.W.
18. { Lorriman, William Henry, Thorpe Common, Pontefract, Yorks.
Barrett, F. W., 12 Stanstead Road, Forest Hill, S.E.
Hurrell, James, 16 Jubilee Cottages, Eltham, Kent.
21. Savage, William, 42 Kingswood Road, Brixton Hill, S.W.
22. { Topper, Jonathan, 70 Etherley Road, West Green, N.
Duncan, George, 31 Rowland Grove, Upper Sydenham, S.E.
24. Parish, Henry G., 39 Canterbury Grove, West Norwood, S.E.
25. Ringe, James, 90 Surrey Lane, Battersea, S.W.
26. Waldon, Walter W., 84 Strathville Road, Earlsfield.
27. { Godfrey, William Henry, 59 Southfields Road, Wandsworth, S.W.
Barrance, F. T., 14 Lannoy Road, New Eltham, Kent.
Palmer, William Stevens, 25 Mount Pleasant Road, Finsbury Park, N.
30. Thompson, Albert William, Garden Cottage, Golder's Hill, Hampstead, N.W.
31. Martin, Edward, 129 Turnpike Road, Hornsey, N.
32. { Firth, Thomas, 47 Rodwell Road, East Dulwich, S.E.
Longley, Walter, 1 Queen's Row, Walworth, S.E.
34. Vyse, John William, 2 Coombe Road, Upper Sydenham, S.E.
35. { Napier, William, 14 Lannoy Road, New Eltham, Kent.
Musk, William, 130 Nevill Road, Stoke Newington.
37. Fisher, Walter, 3 Shafton Road, Victoria Park Road, South Hackney, N.E.
38. Richards, W. J. J., 125 Rotherhithe New Road, S.E.
39. Gallivan, John, 7 Novar Road, New Eltham, Kent.
40. { Eeles, Frank, 18 Regent's Street, Blackheath Hill, S.E.
Brinklow, William James, 1 Stowe House, North End, Hampstead, N.W.
42. Isherwood, Frank, 72 Elizabeth Street, Hurst, Ashton-under-Lyne.
43. Digby, Alfred, 4 Squire's Mount Cottages, Hampstead, N.W.

TRIALS OF ANNUALS, &c., 1906.

A.M. = Award of Merit.**XXX** = Highly commended.

MESSRS. CARTER & Co. sent the following annuals for trial:—

Aster, New Ray.—Flowers large; rose-coloured, with long quill petals. 18 in. **A.M.** September 15, 1905.

Calliopsis, Miniature.—Flowers yellow; marbled and based with rich reddish brown. 9–18 in. Strain not fixed.

Candytuft, Hyacinth-flowered.—A good strain of large, pure white flowers on good pyramidal heads. 12–15 in.

Dianthus, The Bride.—Large single flowers, in colour varying from crimson to rose-lilac, with a broad edge of white. 90 per cent. true. 9 in.

Dianthus, Japanese Feather.—Flowers very large; single; in colour varying from white to red; petals deeply fringed and feathery. 9–12 in.

Dianthus.—Large-flowered dwarf, mixed; flowers large; single; varying in colour from white to red. 6 in.

Dianthus, Silver Lace.—Double flowers of light and dark crimson; laced and fringed with white. 1 ft.

Eschscholtzia, New Carmine King.—A pure strain of this free-flowering annual; flowers carmine, shading to buff at the centre; the outside of the petals bright carmine. 15 in.

Godetia Gloriosa.—A good crimson; free and showy. 1 ft.

Godetia Rosamund.—Flowers pale rose, but with a few “rogues” of deep rose. 1 ft.

Marigold, Dwarf French Gold-edged.—Flowers double; brown-edged; yellow. 6–9 in., but strain not fixed.

Marigold, Legion of Honour.—Flowers bright yellow, blotched at the base with brown. 6 in.

Marigold, Silver King.—Flowers sulphur yellow, blotched at the base with brown. 6 in.

Mignonette, Carter's Perfection.—Red-flowered, on short, broad, stiff spikes. 6–9 in.

Phlox, dwarf, large-flowered, mixed.—A selected strain of *Phlox Drummondii*, of no special merit. 6 in.

Scabious, Carter's Double Dwarf.—Lilac; rose and crimson. 18 in.

Scabious, Carter's Tall Fairy Queen.—Lilac. 2 ft.

Stock (ten-week), Monarch.—Large white flowers on a rather thin spike, with about 50 per cent. doubles. 2 ft.

Sunflower, Carter's Dwarf.—Flowers single; of a bright yellow with dark centre. 2½ in. in diameter. 6–9 in.

Mr. John Forbes, of Hawick, sent *Antirrhinum*, extra choice mixed; good flowers, varying in colour from white to crimson and yellow. 1 ft.

Fancy Pansy, extra choice mixed.—A good strain.

Stocks, East Lothian.—Crimson, rose, scarlet, and white. The white wallflower-leaved strain proved particularly good, blooming freely and showing a mass of compact racemes. 80 per cent. double. 1 ft.

Viola, extra choice mixed.—Of no special merit.

Mr. James Hudson, V.M.H., sent *Salvia splendens* 'Zurich,' a dwarf variety blooming profusely in poor soil; flowers scarlet. 1 ft. **XXX** September 14, 1906.

Mr. F. Rœmer, of Quedlinburg, Germany, sent strains of *Viola tricolor maxima*.

Giant Crown Prince was especially good, with 90 per cent. of very dark bronze-black flowers.

'Volcano' was also good; flowers of various shades of bronze.

Samuel A. M. Satow, Esq., sent seeds of Chinese asters and marigolds received by him from Pekin; but the strains proved inferior to many already in commerce.

Messrs. Sutton & Sons, Reading, sent Sutton's strain of *Nicotiana Sandera hybrida* in various shades of colour. The red small-flowered variety proved true to name; but other shades, though including some very good large-flowered individual specimens, showed rather a large percentage of whites.

DAHLIAS AT WISLEY, 1906.

IN continuation of the trial of Cactus Dahlias in 1905, 104 varieties were planted out early in June 1906, and inspected by a sub-committee of the Floral Committee on September 14. The following varieties were then highly commended (**XXX**) as the best Cactus Dahlias from the point of view of garden decoration :—

A. D. Stoop.
Crépuscule.
Mont Blanc.
Pink Pearl.
Prince of Yellows.
Reggie.
West Hall Scarlet.

The report on most of the varieties in the collection appeared in the JOURNAL, vol. xxxi. p. 227. The following are additional varieties received in the spring of 1906.

1. A. D. Stoop (Stoop).—Light crimson flowers on good stiff stalks ; free-flowering. 4 ft.

2. Antelope (Dobbie).—Fawn, with centre of buff-yellow ; flowers rather buried in the foliage. 3 ft.

3. Bute (Dobbie).—Orange-scarlet flowers of indifferent form ; free-flowering. 2-3 ft.

4. Cockatoo (Dobbie).—Flowers varying in colour from white, and white shaded with pink, to lemon-yellow and buff selfs ; flower-stalks weak. 3 ft.

5. Crayfish (Dobbie).—Salmon-scarlet flowers with much-twisted petals ; of poor form on drooping stalks. 4 ft.

6. Crépuscule (Dobbie).—Buff with yellow centres ; flowers very large and of good form, but not held well above the foliage. 4 ft.

7. Ella Kraemar (Dobbie).—Pink, shading to yellow at the bases of the petals ; flowers on good stalks, but buried in the foliage. 4 ft.

8. Fairy (Dobbie).—A white flower of good form with much-twisted petals ; free-flowering, but the flower-stalks weak and short. 3 ft.

9. Good Hope (Dobbie).—Crimson, with the tips of the inner florets and the greater part of the outer florets white ; but a number of flowers crimson selfs ; flowers large. 3 ft.

10. J. B. Riding (Dobbie).—Orange, with yellow centre ; flowers large but drooping from short stalks.

11. Juliet (Dobbie).—Pink with white at the base of the central florets ; flowers on good stalks, but of indifferent form. 4 ft.

12. Lord of the Manor (Dobbie).—Intense scarlet yellow at the base of the florets ; flowers of little substance and on weak stalks, but of very good form and with twisted petals. 4 ft.

13. Miss Dorothy Oliver (Dobbie).—Soft lemon-yellow, paler at the floret-tips; free-flowering, with scanty foliage, flower-stalks weak. 5 ft.

14. Mrs. E. C. Murray (Dobbie).—White, broad-petalled flowers on long stiff stalks; a late flowering variety. 4 ft.

15. Mont Blanc (Dobbie).—Flowers white, of good form on long stiff stalks, but this variety flowers late, and shows much gross growth. 4–5 ft.

16. Morning Glow (Dobbie).—Buff outer, yellow inner florets; free-flowering. 3 ft.

17. W. E. Dickson (Dobbie).—Reddish-crimson, with the older florets purple; flower-stalks long and strong. 4–5 ft.

18. West Hall Scarlet (Stoop).—Bright scarlet flowers, of good form, on long stiff stalks, showing well above the scanty foliage. 2–3 ft.

19. W. Hopkins (Dobbie).—Large deep-crimson flowers of good form on short weak stalks. 3–4 ft.

BROCCOLI AT WISLEY, 1905 AND 1906.

A COLLECTION of fifty stocks of Broccoli were received for trial, and were sown on March 28, 1905, and planted out three feet apart each way on May 10. As the soil was very poor, it was deeply dug and heavily manured. For some time after planting, the plants made no progress; however, eventually they started and grew vigorously, covering the ground completely with their foliage. With one exception they stood the winter admirably, producing excellent heads of the finest quality.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

1. Autumn Protecting (Sutton).—Heads of medium size; pure white; very firm; good shape, with dark-green foliage curving over the head, which it protects well. A very fine variety. Ready for use December 20.

2. April Queen (Waite).—Heads large; sulphur colour; firm, and of good shape; foliage large and strong. Ready for use April 22.

3. Brydon's Peerless (Kent and Brydon).—Heads large; pure white; handsome; well protected by broad strong foliage; plants very strong growers. Ready for use March 20.

4, 5. Cattell's Eclipse (Hurst, Barr).—Heads very large; sulphur-coloured; good shape; well protected by its own foliage; a strong, vigorous grower. Ready for use April 21.

6. Champion (Barr).—Heads small; solid; compact; sulphur-coloured; foliage small; a very dwarf, sturdy grower. Ready for use April 13.

7. Christmas Purple (Barr).—This is a very early form of the Purple Sprouting Broccoli, coming into use about two months sooner than most kinds. The habit of the plant is very dwarf and compact, standing the winter well. Ready for use January 15.

8. Early Cornish Penzance (Hurst).—Heads medium to large; handsome; pure white at first, changing to a purple shade with age; dwarf, compact habit. Ready for use April 15.

9. Early Purple Cape (Hurst).—Heads of medium size; loose, and inclined to sprout; very strong, tall habit. Ready for use September 24.

10. Early Purple Sprouting (J. Veitch).—This is also known as Asparagus Broccoli, and is one of the hardiest and most useful vegetables, producing an enormous quantity of sprouts for a long period; habit very vigorous and rather tall. Ready for use March 10.

11. Early Snow's Winter White (Hurst).—See No. 42.

12. First of All (Hurst).—Heads small; very firm and compact; pure white; habit dwarf and sturdy, with rather small foliage. Ready for use October 28.

13. Flower of Spring (Hurst).—Heads very large; handsome; solid; pure white; well protected by the foliage; habit very sturdy, with large foliage. Ready for use March 27.

14. Green Prolific Sprouting (Barr).—A green and prolific form of No. 10, and equally good in all points. Ready for use March 15.

15. Hardy Winter White (Barr).—Heads rather small; solid; good shape; pure white; dwarf habit; small foliage. Ready for use March 18.

16. Improved Snow's Winter White (Sutton).—See No. 42.

17. Khaki Protected (Wrench).—Heads medium to large; very solid and compact; pure white; habit very vigorous, with large dark-green pointed foliage; self-protecting. Ready for use April 25.

18, 19. Late Queen, **A.M.** April 17, 1906 (Sutton, J. Veitch).—Heads large; solid; handsome; pure white; habit dwarf; sturdy; moderate foliage; self-protecting. Ready for use April 13. A valuable late variety.

20. Latest of All (Hurst).—Similar to No. 22.

21. Leamington (Barr).—This variety received a **F.C.C.** in 1873 under the name of 'The Leamington.' Heads large; firm; good shape; pure white; habit vigorous; moderate size, with large dark-green foliage; self-protecting. Ready for use April 6.

22. Ledsham's Latest of All, **F.C.C.** May 9, 1882 (J. Veitch).—Heads large; firm; handsome; pure white; plants of medium size; sturdy, with very dark-green foliage; self-protecting. A splendid late variety, with the advantage of the crop not turning in all at the same time. Ready for use May 5.

23. May Queen (Barr).—Very similar to No. 22, but earlier. Ready for use April 21.

24. Methven's June (Hurst).—Heads of medium size; firm; good shape; sulphur colour; plants dwarf; sturdy; self-protecting; moderate foliage. Ready for use May 8.

25. Michaelmas White (Sutton).—Heads very large; firm; handsome; pure white; plants of moderate size, with large protecting leaves. Ready for use November 10.

26, 27. Model, **F.C.C.** May 13, 1890 (J. Veitch, Hurst).—Heads large; conical shape; handsome; firm; pure white; plants dwarf; sturdy; compact; self-protecting. This variety keeps up its reputation well as one of the finest of all late Broccoli. Ready for use April 10.

28. Monarch (Sharpe).—Heads small; firm; white; plants dwarf; sturdy; small foliage; partly protecting. Ready for use April 21.

29. Perfection (Barr).—Heads very large; firm; handsome; pure white; plants very dwarf, with large protecting foliage; very sturdy. Ready for use April 10.

30. Perfection Late White (Hurst).—See No. 29.

31. Purple Sprouting (Barr).—See No. 10.

32. Richmond Late White, **A.M.** April 17, 1906 (Hurst).—Heads medium to large; firm; fine shape; pure white; plants very dwarf and sturdy; foliage large, well protecting the heads. Ready for use April 10.

33. Satisfaction (Sutton).—Heads large; firm; handsome; very white; plants dwarf; sturdy, with large foliage, partly protecting. Ready for use April 3.

34. St. Valentine (Barr).—Heads very large; firm; sulphur colour; plants moderately dwarf with large foliage; self-protecting. Ready for use March 18.

35. Saunders's Late White (J. Veitch).—This is probably 'Lauder's Late White catalogued by Messrs. J. Veitch. A very fine late variety, with large, handsome, pure white heads; plants dwarf; sturdy, with strong pointed leaves. Ready for use May 5.

36. Self-protecting Autumn (Barr).—See No. 1.

37. Self-protecting (J. Veitch).—See No. 1.

38. Snowflake (Hurst).—Heads small; very compact and firm; pure white; plants dwarf, with large thick foliage, partly protecting. Ready for use April 20.

39. Snow-white (Sutton).—Heads large; firm; handsome; pure white; plants medium size, with very large protecting foliage. Distinct from No. 42. Ready for use April 10.

40. Snow's Superb White (Barr).—See No. 42.

41. Snow's Superb White (J. Veitch).—See No. 42.

42. Snow's Winter White (Hurst).—Heads rather small; very firm and compact; handsome; pure white; plants very dwarf and sturdy, with moderate self-protecting foliage. Ready for use January 10.

43, 44. Standwell (Sutton, Barr).—Heads medium to large; firm; good shape; pure white; plants rather tall; sturdy; with distinct pointed foliage; partly protecting. Ready for use April 30.

45. Superb Early White (Sutton).—Heads of medium size; firm; compact; pure white; plants very dwarf, with large sturdy foliage. Ready for use March 20.

46. Victoria Late White (Divers).—Heads of medium size; very firm; handsome; pure white; plants dwarf; sturdy; with dark-green foliage. Ready for use April 24.

47. Walcheren, **A.M.** October 10, 1905 (Barr).—Heads large; firm; handsome; pure white; plants very large, with dark-green stout foliage. A fine true stock. Ready for use October 7.

48, 49. Winter Mammoth (Barr, Sutton).—Tender—did not stand the winter.

50. Yull's Best of All (Green).—Heads large; firm; sulphur-coloured; plants large, with long pointed leaves. Ready for use April 24.

REPORT ON MISCELLANEOUS VEGETABLES AT WISLEY, 1903.

BEANS.

1. Brookland's Scarlet Runner (Deal).—Flower scarlet; foliage extra large and strong; pods in big clusters, averaging 9 inches long; heavy bearer.
2. Excelsior Runner (Fletcher).—Flower scarlet; very similar to No. 1.
3. Flageolet Runner 'Wachs Bohnen' (Raschen).—Height 3 to 4 feet; flower white; foliage pale green; pods usually hanging in pairs, from 6 to 8 inches long; fair crop.
4. Flageolet Butter Bean 'Wachs Bohnen' (Raschen).—Height 15 inches. A dwarf form of No. 3.
5. Green Leviathan Broad Bean (Carter).—Pods of great length, and one of the best of the long-pod section; good crop.
6. July Climbing French (Carter).—Flower white; height 3 feet; foliage dark green; pods long, thin, straight, averaging 9 inches in length, usually in pairs; good crop; pods stringless.
7. Leviathan Broad Bean (Carter).—A white-seeded form of No. 5, with equally long pods.
8. Nobleman Runner (Deal).—Flower scarlet and white; height about 6 feet; foliage large and sturdy; pods 10 inches long, hanging in good clusters; good crop.
9. Rames Don Carlos (Northover).—Not a success.
10. Rames d'Or Haricot (Northover).—Not a success.
11. Scarlet Emperor Runner (Carter).—Flowers scarlet; foliage very strong and dark green; pods in great clusters, averaging 1 foot in length, straight and handsome; good crop. A very fine variety.
12. Successor Climbing (Carter).—White flower. Not a success.

BRUSSELS SPROUTS.

Carter's New Exhibition (Carter).—Plants 2 feet high; sturdy; producing a mass of medium-sized hard sprouts from base to crown.

CABBAGE.

1. Market King (Carter).—Heads rather large; conical, with a moderate spread of outer leaves.
2. Tom Thumb Savoy, Reselected (Carter).—A good stock of this dwarf, compact, early, well-known old variety.

CAULIFLOWER.

1. Early Emperor (Carter).—Plants dwarf, sturdy, with large semi-protecting foliage: heads medium to large in size, white, firm, and of excellent shape.

2. Early Forerunner (Carter).—A very early variety of dwarf, compact habit; sturdy, with rather small, solid, handsome, pure white heads.

CARROT.

Blood Red (Carter).—A very deep-coloured variety with long shapely roots.

LETTUCE.

1. Holborn Standard (Carter).—Cabbage variety; hearts large, solid, crisp, good flavour, with crumpled outer leaves tinged with brown. This variety stood the drought well without running to seed.

2. Lettuce from Pekin (Satow).—A very large variety, growing 2 feet high, and bitter in flavour. It is said the succulent stems are good cooked as a vegetable, but we found it very indifferent and insipid in flavour.

3. Naples Curled Cabbage (De Luca).—A very large firm variety of the Malta or Drumhead type, and too similar to be distinct from that variety.

ONION.

1. Avelline (De Luca).—Bulb small, white, flat, round; small top, resembling Silver-skin.

2. Giant Red (De Luca).—Bulb large, round, green streaked with red; neck thick, with large top. Not a good keeper. Similar to Giant Rocca.

3. Giant Rocca (De Luca).—See No. 2.

4. Pure White (De Luca).—Very similar to No. 1.

5. White Nocera (De Luca).—Same as No. 4.

PARSLEY.

1. Crested Bouquet (Carter).—A beautifully deep curled variety of sturdy, compact habit.

2. Exquisite Curled (Kent and Brydon).—A rather tall growing variety, with large well-curled foliage and spreading habit.

RADISH.

Rose Olive Early (Carter).—A very pretty olive-shape variety, with a deep rose colour and good flavour.

RHUBARB.

Collis's Ruby (Collis).—Planted with the collection at Wisley.

GOURD.

1. Giant Gourd (De Luca).—A yellow fruited variety, not so large as some other varieties in commerce.

2. Zucche Lunge, syn. *Lagenaria vulgaris* (De Luca).—Flowers numerous and white in colour; fruit of great length, often 4 to 5 feet, like a gigantic cucumber. Its long fruit would be effective on a pergola.

3, 4. Zapallo de Tronco, Zapallo Angola (Williamson).—Both these varieties were very similar in habit, form, and colour of fruit. Plants bushy, with medium-sized, flattish, round fruit, yellow striped with green.

VEGETABLE MARROW.

Unnamed variety (De Luca).—Habit bushy; fruits large, long, deep green striped with a darker green; heavy bearer.

TURNIP.

Little Marvel (Carter).—White, round, handsome; foliage short and sturdy. A very early variety that should be valuable for forcing.

MELON.

1. Herati (Burkill).—Fruit large, oval; beautiful golden colour; no netting; white flesh and indifferent in flavour.

2. Sarda (Burkill).—Very similar to No. 1.

3. Wilhite (The Western Orchards Produce Co.).—Fruit large, oval, dark green, heavily netted; flesh scarlet and of very fair flavour. This is the most extraordinary melon for keeping that we have seen, fruits being perfectly sound and fresh six weeks after cutting from the plant.

REPORT ON PEAS, WISLEY, 1906.

ONE HUNDRED AND THIRTY stocks of peas were received for trial in the Gardens, and were sown on March 19 in trenches prepared as if for celery; but of course the seeds were not put so deep as celery plants are. Nearly all the stocks germinated well, and came up strong and healthy; but on the morning of May 18 we had ten degrees of frost, on May 19, five degrees, and on June 5 five degrees, with other mornings registering one and two degrees. These frosts laid the whole of the young growth flat, and blackened them very much; and although they grew again the growth never recovered the strong, vigorous habit it had before the frosts.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

1. A 1 (Sutton).—Height 3 to 4 feet. Haulm and pods light-green, averaging seven large remarkably sweet peas in a pod; heavy crop Ready for use June 23. Seeds wrinkled.

2. Abundance (Sutton).—Height 2 feet. Haulm and pods very dark green; pods in pairs, averaging eight large sweet peas in a pod, which is straight and blunt; very heavy crop. Ready for use June 25. Seeds wrinkled. This is distinct from 'Bliss's Abundance,' which received **F.C.C.** July 15, 1884.

3. Alderman, **F.C.C.** July 10, 1900 (Carter).—Height 5 to 6 feet. Haulm and pods dark green; pods in pairs, averaging nine large fine-flavoured peas in a pod; good crop. Ready for use July 5. Seeds wrinkled.

4, 5. Alderman Selected (J. Veitch, Dobbie).—Both excellent true stocks of No. 3.

6. Ambassador (Carter).—Height 5 to 6 feet. Haulm pale green; pods in pairs, averaging eight in a pod; heavy crop. Ready for use July 12. Seeds wrinkled.

7. American Wonder (Sutton).—This early variety is now surpassed by 'Little Marvel,' 'Harbinger,' and 'Green Gem.' Ready for use June 22. Seeds wrinkled.

8. American Wonder Selected (Carter).—See No. 7.

9. Autocrat, **F.C.C.** July 10, 1885 (J. Veitch).—Height 4 to 5 feet. Haulm and pods dark green; pods in pairs, averaging seven large fine-flavoured peas in a pod; heavy crop. Ready for use July 16. Seeds wrinkled. One of the best late peas.

10. Battleship (Carter).—Height 5 feet. Haulm and pods pale green; pods in pairs, averaging seven large sweet peas in a pod; heavy crop. Ready for use July 9. Seeds wrinkled.

11. The Bell, **A.M.** August 15, 1905 (Bell & Bieberstedt).—Height 5 to 6 feet. Haulm and pods dark green; very sturdy; pods in pairs, averaging

eight large sweet peas in a pod ; heavy crop. Ready for use July 7. Seeds wrinkled.

12. Best of All (Sutton).—Height $3\frac{1}{2}$ feet. Haulm and pods dark green ; pods in pairs, averaging eight large fine-flavoured peas in a pod ; good crop. Ready for use July 5. Seeds wrinkled.

13. Bountiful (Carter).—Height 4 feet. Haulm and pods grass-green ; pods in pairs, averaging six large very sweet peas in a pod ; heavy crop. Ready for use June 28. Seeds wrinkled.

14. Bucks Royalty (Kent & Brydon).—Height $3\frac{1}{2}$ feet. Haulm dark green ; pods in pairs ; very dark, handsome, averaging eight large peas in a pod ; heavy crop. Ready for use July 13. Seeds wrinkled.

15. Buttercup (Carter).—Not a success, never recovering properly from the frost.

16, 17. Centenary, **A.M.** July 5, 1901 (Sutton, Carter).—Height 4 feet. Haulm and pods light green ; pods in pairs, handsome, averaging seven large delicious peas in a pod ; heavy crop. Ready for use July 3.

18. Common Wealth (Carter).—Height $2\frac{1}{2}$ feet. Haulm and pods pale green ; pods in pairs, averaging seven large sweet peas in a pod ; light crop. Ready for use July 15. Seeds wrinkled.

19. Conqueror (Sutton).—Height $3\frac{1}{2}$ feet. Haulm very dark green, strong ; pods in pairs, handsome, averaging eight large fine-flavoured peas in a pod ; heavy crop. Ready for use July 18. Seeds wrinkled.

20, 21. Continuity, **A.M.** July 9, 1898 (Sutton, Carter).—Height $3\frac{1}{2}$ feet. Haulm and pods very dark green ; pods in pairs, averaging seven large very sweet peas in a pod ; very heavy crop. Ready for use July 6. Seeds wrinkled.

22. Councillor (Laxton).—Height $2\frac{1}{2}$ feet. Haulm very dark and sturdy ; pods in pairs, handsome, averaging seven large good-flavoured peas in a pod ; heavy crop. Ready for use July 2. Seeds wrinkled.

23. Daffodil (Carter).—Height $2\frac{1}{2}$ feet. Haulm pale green ; pods in pairs, averaging seven large peas in a pod ; light crop. Ready for use July 10. Seeds wrinkled.

24. Daisy, **F.C.C.** July 11, 1902 (Carter).—This excellent variety was not a success, not recovering properly from the frost.

25. Danby Stratagem, **F.C.C.** July 7, 1882 (Carter).—Stratagem is too well known to need any description. It produced its usual heavy crop. Ready for use July 16. Seeds wrinkled.

26. Daylight (Carter).—Not a success.

27. Délicatesse (Carter).—Height 3 feet. Haulm and pods pale green ; pods in pairs ; curved, averaging six large sweet peas in a pod ; good crop. Ready for use July 9. Seeds wrinkled. This is said to be a favourite variety in France.

28. Diamond (Carter).—Height 9 inches. Haulm and pods light green ; pods in pairs, averaging four large peas in each ; fair crop. Ready for use June 24. Seeds wrinkled.

29. Duchess of York, **A.M.** June 20, 1901 (Sutton).—Height $3\frac{1}{2}$ feet. Haulm and pods very dark green ; pods in pairs, handsome, averaging eight large delicious peas in a pod ; heavy crop. Ready for use June 25. Seeds wrinkled.

30. Duke of Albany Reselected (Carter).—Duke of Albany received an **A.M.** July 5, 1901. This is a fine true stock of this now well-known excellent variety. Ready for use July 2. Seeds wrinkled.

31, 32. Dwarf Defiance, **A.M.** July 5, 1901 (Sutton, Carter).—Height 2 feet. Haulm and pods deep green; pods in pairs, averaging seven large sweet peas in each straight pod; heavy crop. Ready for use July 2. Seeds wrinkled.

33. Dwarf Exhibition (Carter).—Height $2\frac{1}{2}$ feet. Haulm dark green and very strong; pods in pairs, handsome, averaging eight large fine-flavoured peas in each; rather light crop. Ready for use July 9. Seeds wrinkled.

34. Earliest Marrowfat (J. Veitch).—Height 3 feet. Haulm and pods deep green; pods in pairs, averaging six very sweet peas in a pod; heavy crop. Ready for use June 20. Seeds wrinkled. An excellent early variety.

35. Early Marrowfat (Sutton).—Height 3 feet. Haulm and pods deep-green pods; in pairs, averaging six large sweet peas in a pod; heavy crop. Ready for use June 24. Seeds wrinkled.

36. Early Morn, **A.M.** April 18, 1899, as a forcing variety (Carter).—Height 3 feet. Haulm and pods pale green; pods in pairs, averaging six large delicious peas in each; heavy crop. Ready for use June 25. Seeds wrinkled.

37. Eight Weeks (Carter).—Height 1 foot. Ready for use June 22. Practically a failure.

38. Essex Rival (Sydenham).—Height $4\frac{1}{2}$ feet. Haulm pale green, very strong; pods in pairs, deep green, averaging seven large peas in each; heavy crop. Ready for use July 2. Seeds wrinkled.

39. Essex Wonder, **A.M.** July 4, 1905 (Hobday).—Height 5 feet. Haulm and pods grass-green; pods in pairs, handsome, averaging nine sweet large peas in a pod; heavy crop. Ready for use July 6. Seeds wrinkled.

40. Eureka (Sutton).—Height $3\frac{1}{2}$ feet. Haulm and pods dark green; pods in pairs, handsome, averaging nine large delicious peas in each; heavy crop. Ready for use July 14. Seeds wrinkled.

41, 42. Excelsior, **A.M.** July 4, 1905 (Sutton, Carter).—Height $1\frac{1}{2}$ foot. Haulm and pods dark green; pods in pairs, averaging six sweet large peas in each; good crop. Ready for use June 23. Seeds wrinkled.

43, 44. Exhibition Marrowfat (Sutton, Carter).—Height 4 feet. Haulm and pods dark green; pods in pairs, handsome, averaging nine large delicious peas in a pod; heavy crop. Ready for use July 5. Seeds wrinkled.

45, 46. Exonian, **F.C.C.** July 1, 1887 (R. Veitch, Carter).—Height 4 feet. Haulm and pods light green; pods in pairs, averaging six very sweet peas in a pod; heavy crop. Ready for use June 22. Seeds wrinkled.

47. Extra Early Daisy (Carter).—A very good and slightly earlier form of the well-known 'Daisy,' which received a **F.C.C.** July 11, 1902. Ready for use July 3. Seeds wrinkled.

48. Favourite (Carter).—Failed.

49. Giant Edible-podded (Carter).—Height 5 feet. Haulm and pods pale green; pods in pairs. All these edible-podded varieties are cooked whole, and if used when young and the peas small they are very tender and of excellent flavour. This variety is a great bearer of large pods, and was ready for use July 10.

50, 51. Gladstone Selected (Sutton, Carter).—Height 4 feet. Haulm and pods dark green; pods in pairs, handsome, averaging eight very sweet peas in a pod; heavy crop. Ready for use July 9. Seeds wrinkled. A fine true stock of 'Gladstone,' which received a **F.C.C.** July 18, 1902.

52, 53. Glory of Devon, **A.M.** July 11, 1899 (R. Veitch, Carter).—Height 3½ feet. Haulm and pods deep green; pods in pairs, averaging eight large excellent peas in each broad pod; very good crop. Ready for use July 9. Seeds wrinkled.

54. Goldfinder (R. Veitch).—Height 3½ feet. Haulm and pods deep green; pods in pairs, blunt, averaging seven very fine-flavoured peas in each; good crop. Ready for use July 10. Seeds wrinkled. Probably a seedling from 'Ne Plus Ultra,' as it combines most of the good qualities of that excellent old variety.

55. Gradus Selected (Dobbie).—Failed.

56, 57. Green Gem, **A.M.** July 4, 1905 (Sutton, Carter).—Height 1 foot. Haulm and pods very dark green; pods in pairs, averaging five large sweet peas in each; good crop. Ready for use June 24. Seeds wrinkled.

58, 59. Harbinger (Sutton, Carter).—This variety received an **A.M.**, under the name 'Sutton's Harbinger,' June 20, 1901, as distinct from 'Harbinger' sent out by Messrs. Laxton in 1872. Height 1 foot. Haulm and pods dark green; pods in pairs, averaging five large peas in a pod; good crop. Ready for use June 22. Seeds wrinkled.

60. Herald, The (Carter).—Height 1 foot. Haulm and pods very dark green; pods in pairs, averaging six large sweet peas in each; heavy crop. Ready for use July 2. Seeds wrinkled.

61. Ideal, **F.C.C.** July 3, 1903 (Sutton).—Height 3 feet. Haulm and pods dark green; pods in pairs, averaging seven large remarkably sweet peas in a pod; good crop. Ready for use June 22. Seeds wrinkled.

62. Improved Omega (Carter).—A very good stock of 'Omega,' which received a **F.C.C.** in 1872.

63. Improved Ringleader (Sutton).—Height 3 feet. Haulm and pods deep green; pods in pairs, averaging five rather small peas in a pod; heavy crop. Ready for use June 22. Seeds round. A fine stock, but there are now many better-flavoured varieties quite as early.

64. James Grieve (Stanard).—Failed.

65. James Stanard (Stanard).—Height 3 feet. Haulm and pods deep green; pods in pairs, thick, averaging nine large fine-flavoured peas in a pod; heavy crop. Ready for use July 9. Seeds wrinkled.

66. James Welsh (Stanard).—Height 4 feet. Haulm and pods pale green; pods in pairs, averaging seven large peas in a pod; good crop. Ready for use July 6. Seeds wrinkled.

67. Kelvedonian (J. Veitch).—Height 4 feet. Haulm and pods very dark; pods in pairs, handsome, averaging seven large delicious peas in a pod; heavy crop. Ready for use July 2. Seeds wrinkled.

68. King of the Dwarfs (Sutton).—Height 9 inches. Haulm and pods pale green, averaging seven large peas in a pod ; poor crop. Ready for use June 20. Seeds wrinkled.

69. King of the Earlies (Carter).—Height 2 feet. Very light crop, and not a success.

70. Late Queen, **A.M.** July 10, 1900 (Sutton).—Height 3 feet. Haulm very strong and dark ; pods in pairs, averaging seven large fine flavoured peas in a pod ; heavy crop. Ready for use July 14. Seeds wrinkled. A splendid late variety.

71, 72. Little Marvel, **A.M.** July 11, 1902 (Sutton, Carter).—Height 1 foot. Haulm and pods were strong and dark ; pods in pairs, averaging six large delicious peas in each ; heavy crop. Ready for use June 23. Seeds wrinkled. This is one of the best of the dwarf early varieties.

73. Longhurst (Stanard).—Height 3 feet. Haulm and pods light green ; pods in pairs, averaging seven large peas in each ; poor crop. Ready for use July 18.

74, 75. Lord Roberts, **A.M.** July 18, 1902 (Sutton, Carter).—Height 4 feet. Haulm sturdy and very dark green ; pods in pairs, averaging eight large fine-flavoured peas in a pod ; good crop. Ready for use July 10. Seeds wrinkled.

76. Lord Salisbury (Stanard). — Height 3 feet. Haulm and pods light green ; pods in pairs, averaging seven large peas in a pod ; poor crop. Ready for use July 15. Seeds wrinkled. The seeds of this variety did not germinate well.

77. Losely Park Gem (Stanard).—Height 3 feet. Haulm dark green ; pods in pairs, averaging eight large peas in a pod ; light crop. Ready for use July 20. Seeds wrinkled.

78, 79. Magnum Bonum (Sutton, Carter).—Height 3 feet. Haulm dark green, very sturdy ; pods in pairs, averaging six large delicious peas in a pod ; heavy crop. Ready for use July 2. Seeds wrinkled.

80. Maincrop (R. Veitch).—Height 3½ feet. Haulm dark and strong ; pods in pairs, averaging eight large excellent peas in a pod ; heavy crop. Ready for use July 9. Seeds wrinkled.

81. Mammoth Marrowfat (Carter).—Height 4 feet. Haulm and pods very dark green ; pods in pairs, averaging nine large delicious peas in a pod ; good crop. Ready for use July 10. Seeds wrinkled.

82, 83. Masterpiece (Sutton, Carter). — Height 2½ feet. Haulm and pods dark green ; pods in pairs, handsome, averaging eight very large sweet peas in each ; heavy crop. Ready for use July 3. Seeds wrinkled.

84. Matchless Marrowfat (Sutton).—Height 3½ feet. Haulm and pods dark green ; pods in pairs, averaging eight large delicious peas in a pod ; good crop. Ready for use July 6. Seeds wrinkled.

85. May Beauty (Massey).—Height 2½ feet. Haulm and pods light green ; pods in pairs, averaging six large peas in each ; fair crop. Ready for use June 2. Seeds wrinkled.

86. Mayflower (Carter).—Height 2 feet. Haulm and pods pale green ; pods in pairs, averaging six large peas in each ; poor crop. Ready for use June 6. Seeds wrinkled.

87, 88. May Queen (Sutton, Carter).—Height 2 feet. Haulm and

Pods pale green; pods in pairs, averaging five large sweet peas in a pod; good crop. Ready for use June 20. Seeds wrinkled.

89. Michaelmas (Carter).—Height $3\frac{1}{2}$ feet. Haulm and pods very dark green; very sturdy; pods in pairs, averaging seven large fine-flavoured peas in each; heavy crop. Ready for use July 16. Seeds wrinkled.

90. Nonpareil (Sutton).—Height 2 feet. Haulm very dark green and strong; pods in pairs, averaging five very large sweet peas in a pod; heavy crop. Ready for use June 25. Seeds wrinkled.

91. Nonsuch (Sutton).—Height $2\frac{1}{2}$ feet. Haulm and pods dark green; pods in pairs, averaging six large peas in a pod; poor crop. Ready for use July 2. Seeds wrinkled.

92, 93. Peerless, **F.C.C.** July 14, 1903 (Sutton, Carter).—Height 4 feet. Haulm very sturdy; dark green; pods in pairs, handsome, averaging nine large fine-flavoured peas in a pod; very heavy crop. Ready for use July 13. Seeds wrinkled. A splendid variety.

94. Perfect Gem, **A.M.** July 5, 1901 (Carter).—Not a success.

95. Perfection, **A.M.** July 14, 1897 (R. Veitch).—Height $3\frac{1}{2}$ feet. Haulm strong, dark green; pods in pairs, averaging five large remarkably sweet peas in each; heavy crop. Ready for use July 12. Seeds wrinkled.

96, 97. Perfection Marrowfat (Sutton, Carter).—Height 3 feet. Haulm strong, dark green; pods in pairs, handsome, averaging nine large peas in a pod; good crop. Ready for use July 12. Seeds wrinkled. Distinct from No. 95.

98. Perpetual (Sutton).—Height $3\frac{1}{2}$ feet. Haulm very dark green; pods in pairs, broad, handsome, averaging nine large sweet peas in a pod; heavy crop. Ready for use July 6. Seeds wrinkled. Distinct from 'Walker's Perpetual.'

99. Pierremont Gem (Kent & Brydon).—Height 3 feet. Haulm dark green; pods in pairs, handsome, averaging eight large excellent peas in each; good crop. Ready for use July 18. Seeds wrinkled.

100. Prestige, **A.M.** July 5, 1901, under the name of 'Prolific Late Marrow' (J. Veitch).—Height 3 feet. Haulm dark green, sturdy; pods in pairs, averaging nine large delicious peas in a pod; heavy crop. Ready for use July 9. Seeds wrinkled.

101. Prince of Peas (Sutton).—Height 4 feet. Haulm and pods pale green; pods in pairs, averaging six large peas in a pod; good crop. Ready for use June 30. Seeds wrinkled.

102. Prizewinner, **F.C.C.** July 5, 1901 (Sutton).—Height 4 feet. Haulm dark green; pods in pairs, handsome, averaging eight large fine-flavoured peas in each; heavy crop. Ready for use July 18. Seeds wrinkled.

103. Productive (Sutton).—Height 2 feet. Haulm and pods very dark green; pods in pairs, averaging five large peas in a pod; good crop. Ready for use July 3. Seeds wrinkled.

104. Profitable (Laxton).—Height 2 feet. Haulm and pods light green; pods in pairs, averaging six peas in a pod; thin crop. Ready for use June 30. Seeds wrinkled.

105. Progression (J. Veitch).—Height 4 feet. Haulm light green;

Pods in pairs, averaging seven very sweet peas in a pod; heavy crop. Ready for use June 30. Seeds wrinkled.

106. Prolific, **A.M.** July 18, 1902 (Sutton).—Height $3\frac{1}{2}$ feet. Haulm and pods dark green, hanging in pairs, averaging seven large fine-flavoured peas in a pod. Ready for use July 6. Seeds wrinkled.

107. Quite Content, **F.C.C.** August 14, 1906 (Carter).—Height 5 feet. Haulm very dark and strong; pods in pairs, long, handsome, averaging ten large excellent peas in a pod; heavy crop. Ready for use July 11. Seeds wrinkled.

108. Record (Laxton).—Height $1\frac{1}{2}$ foot. Haulm and pods dark green; pods in pairs, averaging six large peas in a pod; heavy crop. Ready for use June 27. Seeds wrinkled.

109. Reliance (Laxton).—Not a success.

110. Renown (J. Veitch).—Height 3 feet. Haulm and pods dark green; pods in pairs, averaging seven large good peas in a pod; fair crop. Ready for use July 20. Seeds wrinkled.

111. Rex (Carter).—Height 5 feet. Haulm very dark and strong; pods in pairs, long, handsome, averaging nine delicious peas in a pod; heavy crop. Ready for use July 10. Seeds wrinkled.

112. Royal, The (Lovelock).—Height $4\frac{1}{2}$ feet. Haulm light green, very sturdy; pods in pairs, averaging seven large sweet peas in a pod; good crop. Ready for use July 18. Seeds wrinkled.

113. Satisfaction (Carter).—Height $3\frac{1}{2}$ feet. Haulm and pods dark green; pods in pairs, handsome, averaging eight large fine-flavoured peas in each; good crop. Ready for use July 9. Seeds wrinkled.

114. Scotsman, The (Bell & Bieberstedt).—Height $3\frac{1}{2}$ feet. Haulm very dark green and sturdy; pods in pairs, averaging seven large good-flavoured peas in a pod; good crop. Ready for use July 9. Seeds wrinkled.

115. Seedling Marrowfat (Sutton).—Height 1 foot. Haulm dark green; pods in pairs, averaging six large delicious peas in a pod; good crop. Ready for use June 25. Seeds wrinkled. An excellent dwarf early variety.

116. Senator, **F.C.C.** July 11, 1902 (Carter).—Height $2\frac{1}{2}$ feet. Haulm strong, very dark green; pods in pairs, averaging six fine delicious peas in a pod; heavy crop. Ready for use June 26. Seeds wrinkled.

117. Springtide (Carter).—Height $2\frac{1}{2}$ feet. Haulm light green; pods in pairs, short, averaging five large peas in a pod; good crop. Ready for use June 22. Seeds wrinkled.

118. Stratagem Selected (Dobbie).—A fine true stock of this favourite old variety. Ready for use July 10. Seeds wrinkled.

119. Sturdy (J. Veitch).—Height 3 feet. Haulm very strong and dark green; pods in pairs, averaging seven large very sweet peas in a pod; good crop. Ready for use July 12. Seeds wrinkled.

120. Superlative (Sutton).—Height 3 feet. Haulm dark green; pods in pairs, averaging eight large peas in a long broad pod; good crop. Ready for use July 2. Seeds wrinkled. This is distinct from and superior to the 'Superlative' that received a **F.C.C.** in 1872.

121. Telephone, **F.C.C.** June 27, 1878 (Carter).—An excellent stock of this well-known variety. Ready for use July 7. Seeds wrinkled.

122. Torpedo (Carter).—Height 4 feet. Haulm dark green and robust; pods in pairs, averaging six large delicious peas in a pod; heavy crop. Ready for use June 28. Seeds wrinkled.

123, 124. Unique (J. Veitch, C. Sharpe).—Height 1 foot. Light crop and not a success.

125. Universal (Sutton).—Height $1\frac{1}{2}$ foot. Haulm very dark green, sturdy; pods in pairs, averaging five large peas in a pod; good crop. Ready for use June 27. Seeds wrinkled.

126. Western Express, **A.M.** July 11, 1902 (R. Veitch).—Height $3\frac{1}{2}$ feet. Haulm strong and very dark green; pods in pairs, averaging seven large fine-flavoured peas in each; heavy crop. Ready for use June 27. Seeds wrinkled.

127. Seedling No. 14 (Carter).—Height 3 feet. Haulm dark green; pods in pairs, handsome, averaging eight large peas in a pod; heavy crop. Ready for use July 12. Seeds wrinkled.

128. No. 16 (Deal).—Height 3 feet. Haulm dark green; pods in pairs averaging seven large sweet peas in each; heavy crop. Ready for use June 27. Seeds wrinkled.

129. No. 23 (Deal).—Height 3 feet. Haulm pale green; pods in pairs, averaging six large peas in a pod; good crop. Ready for use July 2. Seeds wrinkled.

130. No. 24 (Deal).—Height 3 feet. Haulm sturdy, dark green; pods in pairs, averaging six large peas in a pod; good crop. Ready for use July 12. Seeds wrinkled.

REPORT ON POTATOES AT WISLEY, 1906.

ONE hundred and seventeen stocks of Potatoes were received for trial, and planted on March 12, in ground that had previously been deeply dug and liberally manured. The majority germinated well and came up strong, but a series of frosts—viz. May 18, 10°, May 19, 5°, May 20, 1°, June 5, 5°, June 6, 2°, and June 7, 1°—so seriously crippled some varieties that they never recovered, while other varieties, though equally severely cut by frost, recovered in a wonderful manner and produced excellent crops. After examination the Committee, by reason of their heavy crops, excellent appearance, and freedom from disease, recommended the following for the cooking test, viz.

Alpha.	Dr. Gillespie.
Ard Cairn Beauty.	Findlay's Klondyke.
Brydon's Crampton.	Russet Queen.
Brydon's X.L. All.	The Factor.
Conquering Hero.	The Scot.

Up-to-Date.

F.C.C. = First-class Certificate.

A.M. = Award of Merit.

1. Albert Victor (Barr).—White; round; eyes shallow; very small; free from disease. Light crop. Haulm strong. Midseason. White flower.

2. Alpha, **A.M.** July 28, 1903 (Dobbie).—White; flat; round; eyes full; medium size. Heavy crop, free from disease. Haulm short and sturdy. Early. Flowers white.

3. Ard Cairn Beauty (Hartland).—White; round; eyes deep, and tinted with pink; large. Heavy crop, free from disease. Haulm tall and strong. Midseason. Purple flower.

4. Ashleaf (Barr).—A failure.

5. Beauty of Hebron, **A.M.** August 14, 1900 (Barr).—This well-known and popular early variety needs no description. Flowers white.

6. Bright Eyes (Dobbie).—White, tinged with pink; round; eyes shallow; large. Heavy crop, free from disease. Haulm tall and strong. Late. White flower.

7. British Queen, **A.M.** August 15, 1905 (Barr).—This variety suffered from the frost, and was not satisfactory. White flower.

8. Brydon's Crampton, **A.M.** October 23, 1906 (Kent & Brydon).—White, pebble-shaped; eyes full; russety; medium size; handsome. Heavy crop, free from disease. Haulm strong. Late. No flower.

9. Brydon's X.L. All (Kent & Brydon).—White; round; eyes full; russety; large. Heavy crop, free from disease. Haulm tall and strong. Midseason. White flower.

10. Champion (Carter).—White, pebble-shaped; eyes full; russety; small. Light crop, free from disease. Haulm weak. Midseason. No flower.

11, 12. Champion II. (Hogg & Robertson, Dobbie).—White; round; eyes shallow; russety; large. Good crop, free from disease. Haulm tall and strong. Late. White flower.

13. Chiswick Favourite, **F.C.C.** March 30, 1886 (J. Veitch).—White; round; eyes full; russety; handsome; medium size. Good crop, free from disease. Haulm moderate. Midseason or late. White flower.

14. Cigarette, **A.M.** November 21, 1905 (Barr).—White; round; eyes shallow; russety; medium size. Fair crop, free from disease. Haulm strong. Midseason. Purple flower.

15. Claddagh, The (Hartland).—Pink; round; deep eyes; uneven in size. Heavy crop, free from disease. Haulm strong. Midseason. White flower.

16. Coldham's Seedling (J. Veitch).—White; round; eyes full; handsome; large. Light crop, free from disease. Haulm very strong. Late. Purple flower.

17. Colleen (Williamson).—White; round; eyes shallow; russety; medium size. Very heavy crop, free from disease. Haulm tall and strong. Midseason. White flower.

18. Colossal, **F.C.C.** December 13, 1892 (Barr).—White; pebble-shaped; eyes full; small. Light crop, free from disease. Haulm strong. Midseason. Purple flower.

19. Conquering Hero (Williamson).—White; flat; round; eyes full; russety; handsome; medium to large. Heavy crop, free from disease; Midseason. Haulm tall and strong. Purple flower.

20. Crofter, The (Dobbie).—White; flat; round; eyes full; large. Heavy crop, free from disease. Haulm very strong. Late. White flower.

21. Dalhousie Acme (Dobbie).—White; oval; eyes full; large. Heavy crop, free from disease. Haulm sturdy. Late. No flower.

22. Dalhousie Seedling, **A.M.** October 24, 1905 (Kent & Brydon).—White; round; eyes shallow; large; handsome. Heavy crop, free from disease. Haulm tall and strong. Late. Purple flower.

23. Dalmeny Early (Dobbie).—White; round; russety; eyes shallow; medium size. Light crop, much diseased. Haulm weak. Early. White flower.

24. Dalmeny Radium (Dobbie).—White; round; eyes full; large. Heavy crop, free from disease. Haulm rather small. Midseason. White flower.

25. Dalmeny Red (Dobbie).—Red; round; eyes shallow; uneven in size. Very heavy crop, free from disease. Haulm moderate. Late. No flower.

26. Dr. Gillespie, **A.M.** October 9, 1906 (Barr).—Round; white; eyes full; medium size; handsome. Good crop, free from disease. Haulm strong. Midseason. Purple flower.

27. Dreadnought (Massey).—Red; pebble-shape; rough skin; eyes shallow; small. Light crop, free from disease. Haulm weak. Midseason. No flower.

28, 29. Duchess of Cornwall, **A.M.** October 24, 1905 (Williamson, Barr).—White; round; eyes full; russety; handsome; medium to large. Very heavy crop, free from disease. Late. Purple flower.

30. Earl of Lathom (Ashton).—White; round; eyes shallow; very large, and of uneven, bad shape. Heavy crop, free from disease. Late. White flower. Strong haulm.

31. Early Morn (Andrews).—All the crop much diseased.

32. Early Puritan, **A.M.** August 16, 1900 (Barr).—White; round; eyes shallow; very white flesh; medium size. Moderate crop, free from disease. Moderate haulm. Early. White flower.

33. Early Regent, **F.C.C.** October 10, 1893 (Barr).—White; round; russety; eyes shallow; uneven in size. Poor crop, free from disease. Haulm small. Early or midseason. No flower.

34. Early Rose (Barr).—Pale pink; flat kidney; eyes rather deep; large; good shape. Heavy crop, free from disease. Haulm strong and sturdy. Early or midseason. White flower.

35. Eastern Star (Ridgewell).—White; round; eyes shallow; medium size; very even, with a fine, clear skin. Good crop, free from disease. Haulm very strong. Midseason. No flower.

36. Eightyfold (Dobbie).—Pale purple; round; eyes shallow; uneven in size. Light crop, free from disease. Haulm small. Midseason. Purple flower.

37. Ensign Bagley (Dobbie).—White; pebble-shaped; medium size; eyes shallow. Light crop, free from disease. Haulm small. Early or midseason. White flower.

38. Equitable (French).—White; round; eyes full; russety; large. Good crop, free from disease. Haulm tall and strong. Midseason. Purple flower.

39. Eureka (Dobbie).—White; round; eyes deep; large. Very heavy crop, free from disease. Haulm sturdy. Early. No flower.

40. Excelsior (Deal).—White; round; eyes shallow; uneven in size and small. Poor crop, free from disease. Haulm weak. Early. No flower. We question if this is the same as the variety named 'Excelsior,' which was awarded a **F.C.C.** December 3, 1873, and was more of a kidney shape.

41. Factor, The, **F.C.C.** April 25, 1905 (Dobbie).—White; flat; round; eyes shallow; russety; handsome; large. Very heavy crop, free from disease. Haulm tall and strong. Midseason or late. Purple flower.

42. Fair Trade (Boyce).—Tubers very small. Very poor crop, and practically a failure.

43. Favourite (Dobbie).—White; round; eyes full; clear skin; medium size. Fair crop, free from disease. Haulm tall and strong. Midseason. White flower.

44. Findlay's Klondyke (Carter).—White; round; eyes shallow; russety; large. Good crop, free from disease. Haulm tall and strong. Midseason. No flower.

45. First Crop (Carter).—A failure.

46. First Dawn (Hogg & Robertson).—White; round; eyes shallow; very small. Light crop, free from disease. Haulm tall and strong. Midseason. White flower.

47. Fusilier (Hogg & Robertson).—White; round; eyes shallow; uneven in size. Poor crop, free from disease. Haulm strong. Late. White flower.

48. General French, **A.M.** October 1, 1901 (Barr).—White; round; eyes shallow; russety; large. Heavy crop, free from disease. Haulm tall and strong. Late. White flower.

49. General Roberts (Barr).—White; round; eyes shallow; large; handsome. Heavy crop, free from disease. Haulm tall and strong. Late. Purple flower.

50. German Rose (J. Veitch).—Pink; pebble-shape; eyes deep; small; uneven in size. Poor crop. Haulm weak. Late. Purple flower.

51. Gold Coin (Sydenham).—White; round; eyes full; clear skin; large; handsome. Heavy crop, free from disease. Haulm sturdy. Mid-season. White flower.

52. Great Central (Dobbie).—White; round; flat; eyes shallow; small. Poor crop, free from disease. Haulm tall and strong. Mid-season or late. White flower.

53. Gregor's Red Cap (Hogg & Robertson).—Pink; round; eyes shallow; rather small and uneven in size. Heavy crop, free from disease. Haulm strong. Late. White flower.

54. Grenadier (Hogg & Robertson).—White; round; eyes shallow; russety; large. Light crop, free from disease. Haulm tall and strong. Late. White flower.

55. Harbinger, **A.M.** August 5, 1897 (Barr).—A failure.

56. Hillside Crown (Stokes).—White; round; eyes full; russety; very large. Heavy crop, free from disease. Haulm tall and strong. Late. Purple flower.

57. Improved Kidney, **A.M.** December 17, 1901 (Dobbie).—White; flat or kidney-shaped; eyes shallow; large; handsome. Very heavy crop, free from disease. Haulm tall and strong. Midseason or late. Purple flower.

58. King of the Earlies, **A.M.** September 20, 1892 (Barr).—A failure.

59. Leader (Massey).—White; flat; round; eyes full; russety; handsome. Good crop, free from disease. Haulm short. Midseason. White flower.

60. Lilywhite (Carter).—White; round; eyes shallow; small. Poor crop, free from disease. Haulm weak. Early. No flower.

61. Lim Gray, **F.C.C.** September 11, 1903 (Barr).—White; round; eyes shallow; large. Very heavy crop, free from disease. Haulm strong and vigorous. Midseason. Purple flower.

62. Lord Minto (Ross).—White; round; eyes shallow; small and uneven in size. Poor crop, free from disease. Haulm weak. Late. Purple flower.

63, 64. Maid of Coil, **A.M.** September 11, 1903 (Dobbie, Barr).—White; round; eyes shallow; uneven in size. Good crop, free from disease. Haulm moderate. Late. White flower.

65, 66. Midlothian Early (Dobbie, Scarlett).—White; round; eyes full; large; russety; handsome. Very heavy crop, diseased. Haulm strong and robust. Early. No flower.

67. Mr. Ambrose (Dobbie).—Pink; round; eyes full; small. Poor crop, free from disease. Haulm weak. Midseason. White flower.

68. Morning Star (J. Veitch).—Red; pebble-shape; eyes shallow; rough skin; small. Poor crop, free from disease. Haulm weak. Midseason. No flower.

69. Myatt's Ashleaf (Barr).—This excellent and well-known fine-flavoured early variety needs no description. The stock was true, and produced a good crop, free from disease. White flower.

70. New Seedling (Jones).—White; round; eyes shallow; russety; uneven in size. Poor crop, free from disease. Haulm weak. Midseason. White flower.

71. Nobleman (Deal).—White; round; eyes full; russety; handsome. Heavy crop, free from disease. Haulm strong. Late. Purple flower.

72, 73, 74. Noroton Beauty (J. Veitch, Dobbie, Cooper, Taber).—Pinkish-white; round; deep eyes; medium size. Heavy crop, free from disease. Haulm short. Early. No flower.

75. Northern Star (Barr).—White; round; eyes shallow; small tubers which cling to the haulm. Light crop, free from disease. Haulm weak. Midseason. White flower.

76. Pick-me-Up (Boyce).—White; round; eyes full; small and no larger than marbles. Haulm weak. Midseason.

77. Pride of Robertsbridge (Bates).—White; round; eyes shallow; large; clear skin. Light crop, free from disease. Haulm tall and strong. Midseason. White flower.

78. Professor Walker (Barr).—White; round; eyes shallow; uneven in size. Heavy crop, free from disease. Haulm tall and strong. Late. Purple flower.

79. Provost (Dobbie).—White; round; eyes shallow; small and uneven in size. Poor crop, free from disease. Haulm strong. Midseason or late. White flower.

80. Racehorse (Hogg & Robertson).—White; pebble-shape; eyes shallow; moderate size; very clear skin. Heavy crop, free from disease. Haulm tall and strong. Midseason. No flower.

81. Ringleader, **A.M.** July 10, 1900 (Barr).—White; pebble-shape; eyes full; small. Light crop, free from disease. Haulm short. Very early. No flower.

82. Robertsbridge Hero (Bates).—White; round; eyes shallow; large and bad shape. Heavy crop, free from disease. Late. Haulm strong. White flower.

83. Robertsbridge Wonder (Bates).—White; round; eyes deep; large. Light crop, free from disease. Haulm tall and strong. Midseason. White flower.

84. Rob Roy (Massey).—White; round; eyes full; russety; medium size; handsome. Good crop, free from disease. Haulm strong. Late. White flower.

85. Royal Kidney (J. Veitch).—White; long, kidney-shape; eyes full; clear skin; medium size. Heavy crop, free from disease. Haulm strong. Midseason. No flower.

86. Royal Purple (Dobbie).—Purple; pebble-shape; eyes full; medium

size. Good crop, free from disease. Haulm short. Midseason. White flower.

87. Russet Queen, **A.M.** October 23, 1906 (Scarlett).—White round; eyes full; medium size, very even and handsome. Great crop free from disease. Haulm strong. Midsummer or late. White flower.

88. Satisfaction, **A.M.** September 10, 1895 (Barr).—White; flat, round; eyes shallow; russety; medium size. Light crop, free from disease. Haulm strong. Midseason. White flower.

89. Schoolmaster (Barr).—White; round; eyes shallow; medium size, affected with scab. Good crop, free from disease. Haulm moderate. Midseason. White flower.

90. Scot, The (Dobbie).—White; flat, round; eyes shallow; very large. Heavy crop, free from disease. Haulm tall and strong. Late. Purple flower.

91. Selected Eldorado (Massey).—White; round; eyes shallow; russety; small. Light crop, free from disease. Haulm weak. Late. No flower.

92. Selected Russet (Dobbie).—Red; round; eyes full; rough skin; small and uneven in size. Heavy crop, free from disease. Haulm tall and strong. Early or midseason. No flower.

93. Selway's Seedling (J. Veitch).—A failure.

94, 95. Sharpe's Victor, **A.M.** August 14, 1900 (J. Veitch, Barr).—White; flat, round; eyes full; handsome; medium size. Fair crop, free from disease. Haulm dwarf and sturdy. Early. No flower. One of the best early varieties for forcing, or in the open ground.

96, 97. Sir John Llewelyn, **A.M.** September 11, 1900 (J. Veitch, Barr).—White; flat, round, or oval; eyes shallow; medium size; handsome. Fair crop, free from disease. Haulm moderate. Early or midseason. No flower.

98. Sir Mark Stewart (Barr).—White; round; eyes shallow; russety; very large. Heavy crop, free from disease. Haulm strong. Late. Purple flower.

99. Sluntney King Cole (Kent & Brydon).—White; round; eyes full; russety; handsome; large. Good crop, free from disease. Haulm tall and strong. Midseason. Purple flower.

100. Snowball (Barr).—White; round; eyes shallow; large. Heavy crop, free from disease. Haulm strong. Midseason. White flower.

101, 102. Snowdrop Improved, **F.C.C.** August 30, 1883 (Barr).—White; flat, round; eyes shallow. Heavy crop, much diseased. Haulm strong. Midseason. No flower.

103. Southern Queen, **A.M.** November 21, 1905 (Dobbie, Scarlett).—White; flat, round, or oval; eyes shallow; russety; handsome. Heavy crop, free from disease. Haulm tall and strong. Mid-season. White flower.

104. Southern Star, **A.M.** November 21, 1905 (J. Veitch).—White; pebble-shape; eyes full; russety; medium size. Fair crop, free from disease. Haulm strong. Midseason. Purple flower.

105. Star of New Zealand (Henderson).—White; round; eyes full; large and bad shape. Heavy crop, free from disease. Haulm tall and strong. Late. White flower.

106. Supreme, **A.M.** September 11, 1900 (Barr).—White; round; eyes shallow; clear skin; medium size. Heavy crop, free from disease. Haulm tall and strong. Midseason or late. White flower.

107. Sussex Leader (Chatfield).—White; round; eyes full; medium size; clear skin. Good crop, free from disease. Haulm very strong. Midseason. No flower.

108. Talisman (Taylor & Thomson).—White; eyes full; russety; large; handsome. Heavy crop, free from disease. Haulm tall and strong. Midseason or late. Purple flower.

109. Togo (Ross).—Purple; round; eyes full; medium size, Heavy crop, free from disease. Haulm tall and strong. Late. Purple flower.

110. Triumph, **F.C.C.** September 12, 1893 (Barr).—White; round; eyes shallow; large; handsome. Heavy crop, free from disease. Haulm strong. Late. Purple flower.

111. Up-to-Date (Barr).—White; round; russety; eyes shallow; large; handsome. Very heavy crop, free from disease. Haulm tall and strong. Late. Purple flower.

112. Windsor Castle, **F.C.C.** September 12, 1893 (Barr).—White; round; eyes shallow; russety; medium size. Heavy crop, free from disease. Haulm sturdy. Midseason or late. No flower.

113, 114. Two Seedlings under numbers (Harris).—Both failed.

115, 116. Two Seedlings under numbers (Deal).—Both are promising varieties, but the Committee must have them under names, not numbers.

117. Seedling 211 (Deal).—A very promising variety, but it should be named.

TOMATOES AT WISLEY, 1906.

ALTHOUGH it was not intended to have a trial of tomatoes this year, nineteen stocks were sent with requests that they should be tried at Wisley. All were sown early in March and planted out in one of the houses not yet fully occupied. All the stocks made strong, sturdy growth, and cropped very well, and were duly examined by the Fruit and Vegetable Committee.

XXX = Highly Commended.

1. Advancer (Landsell).—Fruit large, bright red, round, handsome, smooth, averaging seven in a cluster; short-jointed. Heavy crop.

2. Beauty (Landreth).—Fruit of medium size, round, smooth, pink, averaging five fruits in a cluster. Good crop.

3. Buckeye (Landreth).—Fruit very large and coarse; many of the fruits over 1 lb. each; round, fairly smooth, pink, averaging five fruits in a cluster. Heavy crop.

4. Carpenter's Superior (Carpenter).—Fruit of medium size, bright red, round, smooth, averaging seven fruits in a cluster.

5. Ever Large (Landreth).—Fruit very large and coarse, flat, corrugated, red, averaging five fruits in a cluster. Heavy crop.

6. Halliwell Gem (Phillipson).—Fruit of medium size, deep round, smooth, bright red; averaging eight fruits in a cluster. A good setter and heavy bearer.

7. Industry (Brown).—Fruit very large, coarse, corrugated, scarlet, averaging six fruits in a cluster. Very heavy crop.

8. June Pink (Johnson & Stokes).—Fruit of medium size, flat, round, smooth, pink, averaging four fruits in a cluster. Good crop.

9. Just the Thing (Harrison).—Fruit of medium size, flat, round, smooth, bright scarlet, averaging six fruits in a cluster. Heavy crop.

10. Large Naples (de Luca).—Not true. There were four distinct varieties.

11. Lord Nelson, **XXX** August 27, 1906 (Atkinson).—Fruit rather small, round, smooth, bright red, averaging seven fruits in a cluster. Heavy crop.

12. Naples (de Luca).—Same as King Humbert.

13. Pockock's Prolific (Pockock).—Fruit large, round, smooth, bright scarlet, averaging seven fruits in a cluster. Heavy crop.

14. Seedling (Lloyd).—Very similar to No. 13.

15. Sparks' Reliance (Johnson & Stokes).—Fruit medium size, handsome, round, smooth, bright red, averaging seven fruits in a cluster. Good crop.

16. Stone (Landreth).—Fruit large, flat, round, smooth, bright red, averaging six fruits in a cluster. Heavy crop.

17. Tamworth Castle (Sydenham).—Fruit of medium size, rather oval, smooth, bright scarlet, averaging six fruits in a cluster. Very heavy crop.

18. Ten Ton (Landreth).—Very similar to No. 18.

19. The King (Sydenham).—Fruit very large, deep round, smooth bright scarlet. Heavy crop.

APPLIANCES &c. TESTED AT WISLEY, 1906.

1. Bush-threader (Sandeman).—A very good little instrument for running thread quickly over bush fruit trees to protect the fruit buds from birds.

2. Clap Clip (Lamotte).—Small pliable pieces of metal for clipping round the stem of a plant or flower, and also clipping the stake. The idea is good, but the clips would be too expensive to use on a large scale, and most gardeners will prefer the old-fashioned system of tying.

3. Fertiliser (Tabor).—A chemical manure with a good percentage of soluble phosphates, nitrogen, and ammonia. This manure was tried on plants in pots, flowering and foliage, and gave satisfactory results.

4. 'Grotting' Fruit-baskets (Cornwall).—These are light, thin cardboard baskets with wire handles, made in variable sizes, suitable for selling with the fruit, and non-returnable. We should imagine they would be very suitable for packing full of fruit in flat boxes for market. A very convenient handy basket.

5. Ideal Powder Bellows (de Luzy).—A capital apparatus for distributing sulphur or other powder over plants infested with fungoid or insect pests.

6. Insecticide (Bentley).—A very good all-round insecticide, proving deadly to all insect life, without any injury to young or old foliage.

7. Insecticide and Fungicide (Linn).—Although this was used at a less strength than recommended or directed, when tried on a 'Royal George' peach tree, slightly infested with mildew, it proved a dangerous remedy, for, though it destroyed the mildew, it likewise destroyed the tree.

8. Lawn Brooms (Dunford).—A flat birch broom, much better than the ordinary broom for sweeping up leaves, grass, &c.

9. Lawn Manure and Plant Food (Wellson).—A good manure for lawns or pot plants, and quite safe if used according to instructions.

10. Liquid Sulphur Mildew Cure (Pinches).—Tried on outdoor roses it proved effectual in killing and checking the mildew.

11. Nicotine (Bentley).—A vaporising insecticide of excellent service in destroying aphids, thrip, and red spider.

12. Nicotine Soap Insecticide (Bentley).—A first-rate liquid insecticide for spraying, dipping, or sponging plants, harmless to the foliage, but deadly to insect life.

13. Paraffin Soap (Timothy & Sandwith).—Very good for all insect pests if used according to directions.

14. Phospho-Nicotyl (Voss).—A preparation sold in tins for killing woodlice, cockroaches, &c. We found it effectual, and also that it killed any mice that ate it.

15. Quassia Extract (Bentley).—A very fine wash for all plants infested with aphids.

16. Slugene-Slugdeath (Stanley).—As its name implies, this is specially made for dealing with slugs. We found it non-injurious to plant life and death to slugs.

17. Soluble Paraffin Oil Insecticide (Bentley).—One of the best insecticides we have ever used, and deadly to insect life without any danger of injury to plants.

18. Spidacide (Bentley).—A very nasty-smelling but excellent preparation for killing red spider.

19. Strawberry-props (made by the blind).—Wire supports for keeping the strawberry crop free from the soil or mulch. As they were received late they will be tried this year.

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Fungoid Pests of Cultivated Plants.

By M. C. COOKE, M.A., LL.D., V.M.H., A.L.S.

Svo. 278 pp., 24 Coloured Plates (Royal Horticultural Society, Vincent Square, Westminster), Half-calf, 10s. 6d. net.

Under the above title the Royal Horticultural Society has just published an invaluable volume, the primary object of which is "to interest and instruct the cultivator in the *simplest and most practical* manner . . . by grouping the pests together according to the nature of their hosts, rather than by following any purely scientific and systematic classification, which would assume considerable previous knowledge, and would be better left in charge of an expert."

As implied by the title, the pests of cultivated plants alone are dealt with, under the following headings:—"Pests of the Flower Garden," "Pests of Garden Vegetables," "Pests of the Orchard and Fruit Garden," "Pests of the Vinery and Stove," "Pests of the Ornamental Shrubbery," "Pests of Forest Trees," "Pests of Field Crops." Then follows a chapter on "Fungicides," which explains very clearly how to make the different washes and sprays, and also gives the proportions in which the various ingredients should be used.

Special attention is directed to the Coloured Plates, which illustrate no less than 357 different fungoid diseases to which cultivated plants are liable; and there are also 23 other Illustrations in Black and White in the text.

Mr. G. MASSEE, F.L.S., V.M.H., the distinguished mycologist at Kew, in reviewing this work, speaks thus of it: "The book is printed on good paper, well bound in half-calf, and is in every sense a credit to its author and to the Royal Horticultural Society under whose auspices it has appeared."

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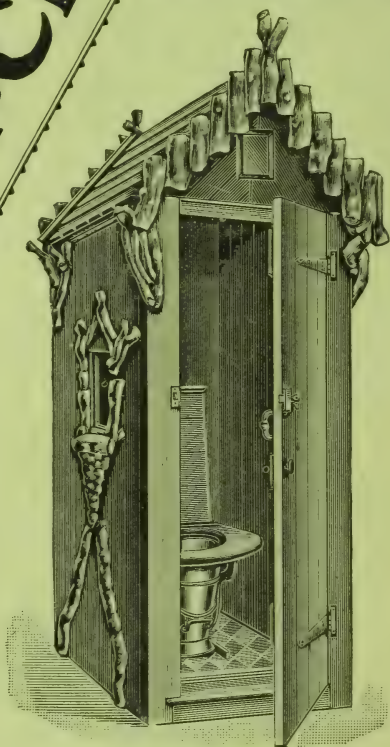
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EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETING.

JANUARY 9, 1906.

Sir TREVOR LAWRENCE, Bart., K.C.V.O. (President of the Society), in the Chair.

Fellows elected (43).—Francis Agar, Wm. Allan, J. W. Avery, B. F. Beagles, George Bedford, Mrs. C. J. R. Bell, Major Hon. Lionel Byng, Dr. Cheming-Pearce, William J. Cousins, Dr. Cowcher, Miss E. Crocker, Joseph Davis, Mrs. E. De la Rue, Miss M. Erskine, Col. J. D. Featherstonhaugh, Geo. Healey Ficher, Mrs. Francis, Mrs. T. M. Harris, Mrs. J. D. Hill, A. Johnson Hoyle, Mrs. Rothesay Jamieson, R. W. Leage, G. W. Leak, Mrs. Lewis, R. R. Loader, Lady Lovat, Samuel T. Love, Robert Maher, Lionel Martineau, Lady Maxwell of Calderwood, Miss H. F. Miles, G. A. Parton, Mrs. T. Patterson, Mrs. R. A. B. Preston, F. R. Ridley, F. J. Sheere, Mrs. Bridgeman Simpson, Valentine G. Stapleton, Mrs. O. W. Street, Wm. Titt, J. J. Van Alen, W. C. Williamson, F. G. Young.

Fellows resident abroad (4).—Edward Hutt (Cape Town), Thomas Church (Western Australia), H. S. Langford (France), W. W. Johnstone (India).

GENERAL MEETING.

JANUARY 23, 1906.

Dr. MAXWELL T. MASTERS, F.R.S., in the Chair.

Fellows elected (61).—Miss M. Alexander, Miss W. M. Baker, W. F. Beauford, Mrs. Berry, Oswald H. Birley, Lady Bliss, Rev. C. H. Bowden, Mrs. H. Brickwood, Mrs. V. Buckland, A. Burden, A. H. Burr, G. F. Buxton, Mrs. A. Clarkson, W. M. Cochrane, Mrs. J. W. Cross, Col. G. A. Curzon, Mrs. T. Drake, Sir R. Farrant, K.B., Miss B. Ferard, R. R. Fowler, C. H. Fox, Francis Frieman, W. H. Gardiner, J. Livingstone Gibson, Mrs. B. Gill, Mrs. Grant, Mrs. W. G. A. Hambling, Mrs. G. Hamilton, Mrs. H. L. Hansard, Mrs. E. A. Harrison, W. B. Hemsley, F.R.S., L. H. E. Hughes, J. M. Jones, Mrs. W. Jones, O. Knight, K. Macandrew, J. McL. Marshall, Mrs. J. A. Marshall, H. Miller, F. H. Munby,

Viscount Newport, J. W. H. Nicholls, Sir W. G. Pearce, Bart., V. G. Phillimore, Arthur Rogers, Henry Rogers, Mrs. Rogers, Arthur Scholefield, Leonard Simpson, Hon. Mrs. Stirling, Lieut.-Col. F. H. Taylor, Mrs. K. Thomas, Mrs. F. Todd, David E. Tower, Rev. A. H. Upcher, J. E. Whiter, J. Wilkinson, Scott B. Wilson, Miss C. A. F. Wood, Lady Wrey, The Hon. Mrs. de Yarburgh-Bateson.

Fellows resident abroad (2).—Dr. Hans Goldschmidt (Germany), J. F. Wustenhoff (Holland).

Associate (1).—John Record.

Society affiliated (1).—Rayleigh and District Horticultural Society.

A Lecture on the "Formation and Care of Lawns and Golf-greens" was given by Mr. Martin H. F. Sutton (see p. 11).

ANNUAL GENERAL MEETING.

FEBRUARY 13, 1906.

Sir TREVOR LAWRENCE, Bart., K.C.V.O. (President of the Society), in the Chair.

Fellows elected (82).—Miss E. Akroyd, W. Allsop, E. Andrews, Miss Barnes, Dr. W. H. Blake, C. H. Blakiston, E. Bowden-Smith, Miss J. B. Brome, C. G. Burrow, Mrs. G. de L'Isle Bush, E. Charrington, J. E. Clark, Leonard L. Cohen, Miss S. L. Cook, H. W. Culham, Mrs. J. S. Curgenven, Miss H. Dawnay, J. T. Dickinson, Mrs. Epps, Miss Franks, T. E. Gatehouse, Alex. Gibb, Miss M. Green, Mrs. C. Egerton Green, Miss F. J. Harrison, Harry J. Haskins, D. J. Hill, A. M. Hooper, Major-Gen. William Howey, Miss H. M. Hudson, Capt. H. A. Johnstone, Jenkin Jones, Mrs. Talbot Kelly, Mrs. Langenbach, Mrs. Le Marchant, Mrs. Leslie, Frank Lindup, The Hon. Mrs. H. Littleton, Mrs. Long, Mrs. McClelland, Mrs. Rawson McDougall, Sir James Mackay, Mrs. J. W. Malyon, Mrs. Marriott, John W. Marshall, Miss C. Martin, Mrs. M. Maude, Mrs. F. J. Methold, O. Mowatt, Mrs. G. Nevitt-Bennett, H. Newman, G. C. Oakley, R. W. Paton, Mrs. Erskine Pollock, Joseph F. Potter, W. Profitlich, R. C. Punnett, Rev. H. A. Rawlinson, James Ronca, Lady Arthur Russell, Miss Olga Schlusser, Mrs. M. J. Shipley, J. Sidey, Mrs. Simpkinson, Miss K. Skinner, Mrs. Hugh Smith, Mrs. V. A. Spencer, Commander A. R. A. Stock, R.N., Frank Stubington, Wm. Tindall, Hon. Mrs. Hanbury-Tracy, E. J. Treseder, H. W. Trollope, P. Debell Tuckett, F. Walder, Mrs. E. Walters, W. H. Weldon, Mrs. Whitehead, F. W. Wigan, T. Winter, Mrs. G. R. Wright, Mrs. J. C. Young.

Fellows resident abroad (5).—Prof. D. Dammer (Dahlem), Wm. Lomas (U.S.A.), Gustäve H. Müller (Rotterdam), Sir Henry Pellatt (Toronto), Dr. George Perez (Teneriffe).

Associates (12).—Miss J. Abercrombie, W. Campbell, Miss C. Dixon, G. Hunt, Miss V. Innes, Miss M. Legg, Miss M. Rogers, Miss W. Saunders, Miss M. Smith, Miss A. Traill, Miss E. Tudor, Alfred E. Vasey.

Societies affiliated (3).—Brixton, Streatham and Clapham Horticultural Society, Southend-on-Sea Horticultural Society, South Merstham Horticultural and Cottage Garden Society.

The President moved the adoption of the Report, which was seconded by Mr. J. Gurney Fowler, and after a few remarks by Mr. H. J. Elwes, V.M.H., and Surgeon-Major Ince, was carried unanimously.

The following names of President, Vice-Presidents, Members of Council and Officers having been duly proposed and seconded, and the list circulated in accordance with Bye-Law 74, and no alternative names having been proposed, were declared by the President to be duly elected, viz. :—

As new Members of Council.—The Right Hon. the Lord Balfour of Burleigh, Major G. L. Holford, C.V.O., C.I.E., Mr. H. B. May, the Right Hon. the Earl of Tankerville.

As Vice-Presidents.—The Right Hon. Joseph Chamberlain, M.P., the Right Hon. the Earl of Ducie, the Right Hon. Lord Rothschild, Sir John T. Dillwyn-Llewelyn, Bart., Baron Schröder, Sir Frederick Wigan.

As Officers.—Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H. (President), J. Gurney Fowler, Esq. (Treasurer), Rev. W. Wilks (Secretary), A. C. Harper, Esq. (Auditor).

The President handed the Victoria Medal of Honour to the following newly appointed recipients, viz. :—

Mr. R. Irwin Lynch, of Cambridge.

Mr. Wm. Marshall, Chairman of the Floral Committee for twenty-one years.

Mr. Thomas Smith, of Newry, Ireland.

Mr. Harry J. Veitch.

Sir John T. Dillwyn-Llewelyn, Bart., moved a vote of thanks to the President, Sir Trevor Lawrence, Bart., mentioning that at this meeting Sir Trevor completed his twenty-first year as President of the Society. This was seconded by Mr. C. T. Druery, and carried with much applause.

REPORT OF THE COUNCIL

FOR THE YEAR 1905.

1. The One Hundred and Second Year.—The year 1905 has been one of development and steady progress in every direction of the Society's manifold operations. The new Hall and the new Garden at Wisley have both demanded much and careful consideration, and it is satisfactory to note that each of them has far exceeded the most sanguine expectations of their suitability for the Society's purposes.

2. The Finances.—The attention of the Fellows is directed to the satisfactory position of the Society, not only as regards its present resources and the number of Fellows, but also in respect to the largely increased privileges of the Fellows and the greatly augmented general work of the Society for the promotion of practical and scientific horticulture. As will be seen from the annexed balance sheet, the Society has invested £18,430 in public securities; the Hall, with its equipment and furniture, represents at least £41,000; and the works already executed at Wisley have cost over £5,600. All these are genuine assets to the credit of the Society; and, despite the increased necessary

expenditure at Vincent Square compared with that at the Drill Hall, the credit balance on the year's working is £6,203.

3. Deputations.—The Society was represented at the great International Horticultural Show at Paris in May 1905 by Sir Albert Rollit, Bart., M.P., Major Holford, C.I.E., C.V.O., Mr. J. Gurney Fowler, Mr. Harry J. Veitch, F.L.S., and the Secretary, who were empowered by the Council to award the Society's Medals to exhibits of conspicuous excellence. It is needless to say that the Members of the deputation were welcomed with all the enthusiastic vivacity for which our friends over the Channel are so universally renowned; everything they could do to promote the geniality and friendly feeling of the meeting was done; and as a slight acknowledgment of the gracious reception accorded to the deputation by the President of the Republic and Madame Loubet, the Council presented him with the Society's Flora Medal in Gold suitably inscribed, with which Monsieur Loubet expressed himself as being much gratified. Another deputation consisting of the President, Mr. George Bunyard, V.M.H., Mr. James Hudson, V.M.H., Mr. A. H. Pearson, Mr. H. B. May, Mr. H. J. Veitch, F.L.S., and the Secretary, visited the International Horticultural Exhibition at Edinburgh, on September 18, when Medals were also awarded, and the deputation met with every kindness and attention, receiving a truly Scotch welcome.

4. The Council.—In the spring of 1905 the Council heard with the deepest regret that, owing to the state of his health, Baron Schröder was unable to continue to occupy his seat on their board. As this decision was definite, had it been possible the Council would at once have invited the Fellows to put so honoured a name on the list of Vice-Presidents of the Society, but as it was found that this could only be done at an annual meeting, they had no choice but to postpone it till the present occasion when they are confident that the heartiness of the vote of the Fellows will be in no way affected by the unavoidable delay. Baron Schröder's services to the Society and to horticulture generally are such as will ever make his name respected and beloved by all gardeners and plant lovers who will, one and all, join in wishing that he may enjoy many years of rest in his retirement.

A very heavy loss to the Council and to the Society—as indeed to many other public institutions—was experienced towards the close of the year by the death of the Right Hon. the Earl of Ilchester, who took the liveliest interest in the welfare of the Society and regularly attended the Meetings of Council up to within a few weeks of his death. The very successful summer Shows which were held in the Park of Holland House, Kensington, in 1902, 1903, and 1904, are fresh in the memory of everyone, and only quite recently he had again given permission for the Show to be repeated on July 10 and 11, 1906, a privilege which has since been most kindly confirmed by the Dowager Countess of Ilchester.

5. Retiring Members of Council.—Under Bye-Law 60 the three members of Council who have been longest in office retire each year, but are eligible for re-election. The three thus retiring this year are Major Holford, C.V.O., C.I.E., Mr. H. B. May, and the Hon. W. F. D.

Smith, M.P., who was appointed by the Council to sit in the place of Baron Schröder; there is also the vacancy caused by Lord Ilchester's death to be filled.

6. Victoria Medal of Honour.—During the past year five of the oldest and most respected holders of the Victoria Medal of Honour in Horticulture have passed away in the persons of Mr. William Paul, of Waltham Cross; Mr. Richard Dean, of Ealing; the Rev. H. Honywood D'Ombraín, of the National Rose Society; Mr. F. W. Burbidge, of Trinity College, Dublin; and Mr. Henry Eckford, of Wem, to whom we owe so many of the most beautiful sweet peas.

7. Deceased Fellows.—Among the Fellows whose loss since January 1, 1905, the Council have to regret are—Stephen Osborn, Professor G. B. Howes, Sir Robert Jardine, James Epps, the Earl of Morley, William Paul, V.M.H., Lord St. Helier, the Earl Stanhope, Sir Hugh Low, Sir Mark W. Collet, Lieut.-Colonel W. G. Webb, Rev. T. Marsh, Richard Dean, V.M.H., Dowager Lady Williams Wynn, Lord Inverclyde, John Bidgood, Rev. H. H. D'Ombraín, V.M.H., Lady Cave, Sir Clinton Dawkins, the Earl of Ilchester, Henry Eckford, V.M.H., F. W. Burbidge, V.M.H., Rev. C. MacMichael, Chas. Moore (N.S.W.), David P. Laird, Henry Bingel, and the Rev. Dr. Bartrum.

8. Annual Progress.—The following table will show the Society's progress in regard to numerical strength during the past year:—

LOSS BY DEATH IN 1905.				FELLOWS ELECTED IN 1905.			
		£	s. d.			£	s. d.
Life Fellows . . .	10 . . .	0	0 0	4 Guineas . . .	12 . . .	50	8 0
4 Guineas . . .	1 . . .	4	4 0	2 " . . .	540 . . .	1,134	0 0
2 " . . .	21 . . .	44	2 0	1 " . . .	695 . . .	729	15 0
1 " . . .	62 . . .	65	2 0	Associates . . .	29 . . .	15	4 6
	94	£113	8 0	Affiliated Societies	33 . . .	34	13 0
				Commutations	21 . . .		
				= £491 2s. 0d. }			
LOSS BY RESIGNATION &c.					1,330	£1,964	0 6
		£	s. d.				
4 Guineas . . .	1 . . .	4	4 0	Deduct Loss . . .		686	14 0
2 " . . .	64 . . .	134	8 0	NET INCREASE IN INCOME		£1,277	6 6
1 " . . .	393 . . .	412	13 0				
Associates . . .	12 . . .	6	6 0	New Fellows &c.		1,330	
Affiliated Societies	15 . . .	15	15 0	Deduct Resignations and Deaths		579	
	485	£573	6 0	NUMERICAL INCREASE during the			
TOTAL LOSS	579	£686	14 0	year 1905		751	

The total number of Fellows, Members, Associates, and Affiliated Societies is now 9,111.

9. Journal.—The JOURNAL continues to maintain its position in the esteem of the Fellows, and its high rank among the publications of the Scientific Societies of Europe and America. Parts I., II., and III. of Vol. xxix. were published in the spring, and Part IV. appeared at the end of last year. The Report of the Conference of Fruit Growers, now in the press, will form a separate volume, and the first part of Vol. xxxi. will be issued in the summer.

10. Editorship.—The rapid increase in late years of the general work of the Society has rendered it impossible for the Secretary to continue to act also as Editor of the JOURNAL, and the Council have

pleasure in announcing that they have secured the services of Mr. George S. Saunders, F.L.S. (son of that staunch supporter of the Society, the late Mr. Wilson Saunders, F.R.S.), to take over the superintendence of this part of the Society's work.

11. Pamphlets.—The second edition of that most useful pamphlet on "Rules for Judging and Hints to Schedule Makers," which was first published in 1896, having become exhausted, a third and greatly amended edition has been issued. A newly revised edition of the popular pamphlet on "Varieties of Fruits for Cottagers, Small Farmers and Private Gardens" has also been published with additional Notes on Root-pruning &c., and the whole has been brought up to date. A new edition of the list of Orchid Awards given by the Society from 1859 to December 31, 1905, has also been prepared and Fellows can be supplied with it on application at a cost of 5s., which is much less than the cost of production.

12. Examinations.—The Society's Thirteenth Annual Examination in the Principles and Practice of Horticulture was held on April 12, 1905, when 160 candidates entered, and the result will be found in the JOURNAL (Vol. xxix. pp. 688-692). The continued popularity of this Examination will be seen from the subjoined table of results since its first establishment in 1893:—

Year	1st Class	2nd Class	3rd Class	Failures	TOTAL
1893	12	36	74	82	204
1894	11	37	45	33	126
1895	12	37	73	47	169
1896	16	53	49	34	152
1897	87	54	28	12	181
1898	87	61	36	6	190
1899	80	50	30	5	165
1900	141	61	30	4	236
1901	109	85	25	6	225
1902	97	98	28	6	229
1903	15	62	111	10	198
1904	35	93	62	...	190
1905	20	67	71	2	160

This Examination will be again held on Wednesday, March 28, 1906, at as many centres as may be necessary to suit the convenience of candidates.

The Examination in Cottage and Allotment Gardening for Elementary and Technical School Teachers only, which was held for the first time in 1904, was repeated on April 5, 1905, when 139 entries were received as against 124 in 1904. The results will be found in the JOURNAL (Vol. xxix. pp. 693-6). In order to further encourage the candidates in this examination the Council have decided that those who pass in the first class, and desire to become Fellows of the Society, shall be exempted from the payment of the entry fee, a privilege hitherto confined to working gardeners earning their living thereby, and Fellows permanently resident outside the United Kingdom. This examination will again take place in London and at other centres in the provinces on Wednesday, April 11, 1906.

In compliance with a request from certain County Council authorities, the Council of the Society consented to hold a special Examination on January 11, 1906, for Gardeners employed in the London and other town public parks and gardens.

13. Local Societies.—A scheme for the affiliation of Local Horticultural and Cottage Garden Societies was put forward in 1890, and more than two hundred Local Societies have availed themselves of it. In order to enhance the utility of the Society, the Council have caused a Special Card to be prepared for use by Affiliated Societies for the purpose of granting Certificates or Awards, or for Complimentary Cards of Thanks, Commendation, &c. They have also caused a new Medal to be struck which is only to be used by Affiliated Societies, and which is supplied to them at cost price. The Affiliated Societies have also many other privileges, particulars of which may be obtained from the office. Fellows are reminded of the many and great advantages which Local Societies derive from affiliation with the Royal Horticultural Society, and they are invited to introduce these privileges to the various Societies in their own neighbourhood.

14. Information.—The Council note with much satisfaction that the number of Fellows seeking information from the Society's officers continues to increase rapidly, and some thousands of answers have been given to inquiries of every description. They would remind Fellows that the officers of the Society are ready at all times to afford any information and assistance in their power to any of the Fellows on matters of horticultural interest, such as the identification of plants and fruits, doubtful matters of practice and other similar questions. The Scientific Committee will gladly report on the nature of any botanical, diseased, abnormal, or curious specimens of plants, &c., which the Fellows may submit for their notice. Special seeds are obtained and other inquiries made for members resident abroad. Any Fellow wishing to study any particular branch of gardening operations, or to make any special observations on different subjects at the Garden or elsewhere, should make direct application to the Secretary.

15. The Society's Hall.—The new Hall has exceeded the most sanguine expectations of the Council and Fellows, both in respect of its suitability for the Society's purposes and of the demand for hiring it by other societies and individuals. The past year has been one of completion, improvement, and development. Various minor defects and faults have naturally been discovered, and these have been, or are being, corrected. A stepped platform-superstructure has been made for orchestral performances, which is almost identical with that formerly used at St. James's Hall.

16. Legacies ; and Gifts to the Hall.—Two very welcome bequests have been received during the past year, one of £250 under the will of the late Mrs. Begley of St. Peter's Square, Hammersmith ; the other of £50 under the will of the late Mr. J. Cohen of St. Mark's Crescent, Regent's Park. The Council venture to remind Fellows of this way of

handing on the benefits and enjoyment of the Society to future generations.

Various other gifts have been received, including a handsome clock for the Council Chamber from Lady Macleay, in memory of Sir George Macleay, of Pendell Court; a Microscope, for the use of the Scientific Committee, from Mrs. H. H. France-Hayhurst, and another for use at Wisley from General Sir Henry Yorke, K.C.B. Sir Trevor Lawrence, Bart., President of the Society, has also presented two additional high-power object lenses for each of the microscopes.

17. Letting.—In issuing the regulations for letting the Hall and other parts of the building, the Council adopted the liberal policy of making the charges inclusive of heating or cooling, lighting or shading, seating or tabling, as the lessees in each case might require. They further decided to make considerable reductions to Charitable Institutions and Horticultural Societies, and for a series of Meetings or performances. No expense has been spared, either during the actual erection or subsequently, in making the Hall second to none in the metropolis, and there are no restrictions as to particular refreshment contractors to be employed, or on other similar points. This policy has resulted in the Hall becoming popular with lessees who have in several cases desired to hire it annually, and have recommended it to their friends, so that no less than £700 has been received from the following sources during the first year 1905:—

Concerts by the Bach Choir, the Magpie Madrigal Society, The Navy League, The St. Margaret's Musical Society, and the "A" Division of the Metropolitan Police.

Receptions and Meetings by the British Women's Temperance Association, The Liberal Social Council, the Westminster Constitutional Association, and The Women's Liberal Federation.

The Intermediate Examination of the University of London.

Exhibitions of the National Potato Society, The "Evening News" Chrysanthemum League, The Westminster Deanery Temperance Union, The Ladies' Kennel Association, The Wimbledon Canine Fanciers' Association, Show of Toy Dogs, Madame Osterberg's Physical Culture, The Food and Cookery Association, The London Medical Exhibition, and The Smoke Abatement Conference.

Several of these have also engaged the Hall in 1906 as well as:—

The Clarion Van's Social Meeting.

Dance in aid of the Teachers' Orphanage.

Concert in aid of the Colonial Nurses' Association.

Church of England Zenana Mission—Annual Meeting.

The International Philatelists' Exhibition.

The Chemical Exhibition.

The Royal Waterloo Hospital Bazaar.

The Fellows are asked to continue to make known the fact of the Hall being available for hire, so as to reduce the pressure of the very heavy charges for ground rent, rates, taxes, and other matters connected with the building.

18. The Library.—The whole of the books in the Library have been cleaned and put in order at the sole charge of Baron Schröder, V.M.H.,

and the Council have caused a brass tablet recording the fact to be erected in the Library. The Veitch Memorial Trustees have also made a donation of £50 towards the Funds of the Library.

Fellows having Books on Horticulture and Botany which they can spare from their own shelves, and those writing books or articles on Horticultural subjects, are invited to contribute them to the Society's Library.

19. Shows in 1906.—The shows during the past year have numbered 27, occupying 36 days in all; and already 33 shows have been arranged for 1906, lasting over 42 days. These include 24 fortnightly meetings, one Home-grown Fruit Show, three Colonial-grown Fruit Shows, one Special Show of Table and other Decorations, and the Annual Shows of Sweet Peas, Carnations, Autumn Roses, and Potatoes, to which the Council have arranged for Fellows' tickets to admit.

20. The Temple Show.—By the kindness of the Master and Benchers, the Society was able to hold its Great Show of Flowers for the eighteenth year in succession, on May 30 and 31, and June 1, in the gardens of the Inner Temple, and, despite the extremely unsettled weather, both the exhibits and the attendance exceeded the average of the last few years. Arrangements have been made for the Show to be held on May 29, 30, and 31, 1906.

21. The Summer Show.—By the kind permission of the Lords Commissioners the Great Summer Show of 1905 was held in the grounds of the Royal Military Hospital, Chelsea. Only a short time before his death the late Earl of Ilchester again most kindly placed Holland House Park at the Society's disposal for the 1906 Summer Show, on July 10 and 11.

22. Fruit and Vegetable Shows.—The Society's Twelfth Annual Show of British-grown Fruit was held in the Hall on October 10, 11, and 12; a Show of Home-grown Vegetables on October 24; and a special exhibition of Home-grown Bottled and Preserved Fruits on December 5 and 6.

23. Colonial Fruit Shows.—Two further Shows of Colonial Fruit and Vegetable products, in succession to that on December 13 and 14, 1904, have been held on March 30 and 31, and December 5 and 6, 1905. The interest taken in these has led the Council to arrange for similar Shows on March 22, 23, and 24, June 6 and 7, and December 4 and 5. The object in fixing these dates is to suit as far as possible the season which is most likely to find the produce of Canada, British Columbia, and the West Indies, of India and the Cape, and of Australia, Tasmania, and New Zealand, in the greatest perfection in London. The Agents-General and other authorities are most kindly rendering every assistance, and the Council trust that both growers and shippers will do their best to send Exhibits worthy of our Colonies, and to show what they can produce for the home markets at those times when home-grown fresh fruits are necessarily scarce and expensive.

24. Kindred Societies.—The following Shows were held by kindred Societies in connection with certain of the Society's fortnightly Exhibitions in 1905:—

April 25.—National Auricula and Primula Show.

May 23.—National Tulip Show.

July 4.—National Sweet Pea Show.

July 18.—National Carnation and Picotee Show.

Sept. 26, 27.—National Autumn Rose Show.

These Societies will continue to hold their Shows at the Hall, but they will not in future take place on days fixed for the Royal Horticultural Society's own Exhibitions. The Council have, however, made arrangements by which R.H.S. tickets will admit to these kindred Societies' Shows.

25. Awards.—The number of awards granted by the Council, on the recommendation of the various Committees, will be seen from the following table:—

Awards	Paris Show	Edinburgh Show	Purchased by Affiliated Societies	Temple Show	Chelsea Show	Colonial Fruit Show, Mar. 30, 31, 1905	British-grown Fruit Show	Show of Colonial-grown Fruits & of Preserved Fruits, Dec. 5 & 6, 1905	On Recommendation of				Total
									Fruit Committee	Floral Committee	Orchid Committee	Narcissus Committee	
Gold Medal	4	3	—	10	6	3	2	1	2	4	7	1	43
Silver Cup	—	—	—	24	16	—	—	1	—	—	—	—	41
Silver-gilt Hogg Medal	—	2	—	—	—	—	2	—	—	—	—	—	4
Silver-gilt Flora	6	5	—	16	10	—	—	—	—	26	21	5	89
Silver-gilt Knightian	3	3	—	2	1	6	3	6	8	—	—	—	32
Silver-gilt Banksian	3	8	—	7	9	5	1	—	4	25	—	6	68
Silver Hogg	—	2	—	—	—	—	2	—	5	—	—	—	9
Silver Lindley	—	—	—	—	—	—	—	—	—	—	3	—	3
Silver Flora	7	3	—	9	12	—	—	—	—	55	29	8	123
Silver Knightian	1	1	—	4	1	5	2	5	17	—	—	—	36
Silver Banksian	—	3	6	12	27	6	—	6	21	99	22	9	211
Bronze Flora	—	—	—	—	—	—	—	—	—	32	—	1	33
Bronze Knightian	—	—	—	1	—	—	—	—	—	—	—	—	2
Bronze Banksian	—	—	5	—	—	1	—	—	1	11	1	—	19
Silver Gilt... } Affiliated {	—	—	17	—	—	—	—	—	—	—	—	—	17
Silver ... } Society's {	—	—	50	—	—	—	—	—	—	—	—	—	50
Bronze ... } Medal {	—	—	39	—	—	—	—	—	—	—	—	—	39
First-class Certificate	—	—	—	5	2	—	—	—	5	8	30	2	52
Award of Merit... ..	—	—	—	19	9	—	—	—	38	144	90	18	318
Botanical Certificate	—	—	—	1	—	—	—	—	—	2	29	1	33
Cultural Commendation	—	—	—	1	—	—	—	—	12	4	14	1	32
Total	24	30	117	111	93	27	12	19	113	410	246	52	1254

In addition to the above, Silver-gilt Flora Medals were awarded to Miss A. J. Tate for having passed first in the Society's Examination in Horticulture held on April 12, and a similar one to Mr. Josiah W. Hardy for having passed first in the Examination in Cottage and Allotment Gardening on April 5. One hundred and forty-eight Bronze Banksian Medals have also been granted to Cottagers' Societies.

26. Special Cups.—In addition to the fifty-guinea Veitchian Cup and the £10 10s. Sherwood Cup, the Council have received with great

pleasure an offer from Messrs. Watkins & Simpson to give a £10 10s. Cup for flowering Annuals in pots, which will be offered in 1907 for the first time (see pp. 33, 34 of the "Book of Arrangements for 1906"). Messrs. Barr also continue their offer of a Daffodil Cup.

27. Lectures in 1905.—The following Lectures have been delivered at the General Meetings of the Fellows during last year, and the Council desire to place on record their heartiest thanks to the Lecturers:—

- Jan. 24.—The Assistant Secretary, on German Methods of Fruit Preserving.
- *Feb. 28.—The Hon. J. H. Turner, on Fruit-growing in British Columbia.
- *Mar. 14.—The Rev. Prof. G. Henslow, V.M.H., on Bud Variation
 „ 28.—Mr. Frank Pink, on Bananas.
- April 11.—Mr. T. J. Powell, on Retarded Potatoes.
 „ 25.—Monsieur Albert Maumemé, on the Japanese Dwarfing of Trees, and
 Mr. James Hudson, V.M.H., on the Making of Japanese Gardens in England.
- *May 9.—Mr. N. Hayashi, on Japanese Horticulture, and
 Mr. Reginald Farrer, on Japanese Plants and Gardens.
- * „ 23.—Mr. E. M. Holmes, on Medicinal Plants Old and New.
- *June 20.—The Rev. Prof. G. Henslow, V.M.H., on Plants of the Bible.
- *July 18.—The Superintendent, on the Wisley Garden.
- *Aug. 1.—Mr. Charles T. Druery, V.M.H., on British Ferns and their Wild Sports.
 „ 15.—Prof. H. J. Webber, on the Progress of Fruit Growing in the United States.
 „ 29.—Mr. R. Lewis Castle, on Trees for Towns.
- *Sept. 12.—The Rev. Prof. G. Henslow, V.M.H., on the True Meaning of Natural Selection.
 „ 26.—Mr. W. F. Cooling, on Autumn Roses.
- Oct. 24.—Mr. W. P. Wright, on Potatoes.
- Nov. 7.—Dr. J. A. Voelcker, M.A., F.I.C., on Chemistry in Relation to Horticulture.
 „ 21.—Mr. E. T. Cook, on Hollies.
- Dec. 5.—Mr. C. Herman Senn, on Crystallisation of Fruits and Flowers.
- * „ 6.—Mr. R. M. Palmer, on the Fruit Industry of British Columbia.
- * „ 19.—Prof. Craig, on Orchard Management from a Commercial Point of View.

* Lecture illustrated by Lantern Slides.

28. Conference of Fruit Growers.—In connection with the Show of British-grown Fruit, a Conference on Fruit-growing was held by the Society in conjunction with the National Fruit Growers' Federation on October 10, 11, 12, when the subjects discussed included "Foreign

Competition and How to Meet it," "Fungoid and Insect Pests," "Land Tenure and Rating Difficulties," "Railway Grievances," and "the Proposed Establishment of an Experimental Fruit Farm by the Board of Agriculture." The Conference attracted considerable attention and was well attended. The papers read, and a complete illustrated report of the discussion, will be published as a separate Volume of the Society's JOURNAL early in the spring of 1906.

29. Special Orchid Classes in 1906.—At the suggestion of the Orchid Committee the Council have adopted a scheme which they hope will have the effect during the ensuing year of inducing Orchid growers, both large and small, amateur and professional, to exhibit their already certificated and other choice varieties at the fortnightly Shows of the Society. Without in any way wishing to alter or curtail the Exhibits as at present shown, *which they hope will be continued exactly as they are now*, they propose to award additional Diplomas to plants of exceptional merit staged in one group. This group will be composed of all the Exhibits duly entered for this special competition in accordance with the schedule. They hope that by this means groups may be brought together representing as far as possible all the varieties of the particular species decided upon for exhibition on each occasion, together with the hybrids having that species as one of their parents. At the same time the Society's paintings of the species, and hybrids therefrom, to which awards have already been given, will be exhibited. They believe that these exhibits will have a great educational value to hybridists, orchidists, and the Fellows generally, and they rely upon all Orchid growers to assist them in making the exhibit as complete as possible. Full particulars will be found in the Book of Arrangements for 1906, pages 57-60.

30. International Conference on Plant Breeding.—Very successful Conferences on Plant Breeding, whether by hybridisation or by cross-fertilisation, have been held already, one in London under the Society's auspices in 1899, and a second in New York under the auspices of the Horticultural Society of New York, U.S.A., in 1902. A third has now been arranged by the Council to take place in London, commencing on July 30, and concluding on August 3, 1906.

It is felt that such Conferences afford an unusually good opportunity for scientific and practical men to become acquainted with each other's methods and ideas, and it is hoped that representatives of both classes of students will respond to this invitation to take part in the proceedings.

The programme, as far as at present arranged, is as follows:—

Monday, July 30.

9 P.M. Conversazione in the Society's Great Hall.

9.30. Address of Welcome by the President of the Society, Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., &c.

10. Lantern slides of various hybrids. The loan of any interesting slides would be greatly esteemed.

Refreshments will be served during the evening.

The price of tickets for the Conversazione will be, to Fellows, 2s. 6d.

Tuesday, July 31.

First Session of the Conference.

10.30. Opening Address by W. Bateson, Esq., F.R.S., President of the Conference.

1.15. Light Luncheon.

2.30 to 5. Second Session of the Conference.

6.30. Dinner at the Hotel Windsor at the kind invitation of the Horticultural Club.

Wednesday, August 1.

10.30 A.M. to 12.45. Third Session of the Conference.

1.30. Luncheon at Burford, at the kind invitation of the President of the Society, Sir Trevor Lawrence, Bart., K.C.V.O., V.M.H., &c.

Thursday, August 2.

10.30 A.M. to 1. Fourth Session of the Conference.

1.15. Light Luncheon.

2.30 to 5. Fifth Session of the Conference.

7. Banquet in the Great Hall.

Friday, August 3.

10.30 to 11.30. Visit the Natural History Museum.

12. Visit the Gardens at Gunnersbury.

1.30. Luncheon at Gunnersbury, at the kind invitation of Mr. Leopold de Rothschild.

3 to 5. Visit Kew Gardens.

Ladies are cordially invited to the conversazione and the banquet, to both of which they will be gladly welcomed. The charge to Fellows for tickets for the conversazione will be 2s. 6d., and for the banquet probably £1 1s. Fellows will be allowed to introduce friends to both these gatherings.

31. Wisley.—The new Garden, which was so generously presented to the Society by Sir Thomas Hanbury, V.M.H., K.C.V.O., is gradually getting into thorough working order. Fine collections of flowering shrubs have been received from the Director of Kew Gardens, and from the leading nurserymen; and representative collections of roses have also been given by the principal rose-growers. Much, however, still remains to be done as soon as the state of the finances will permit.

Mr. George Massee, V.M.H., has kindly undertaken some original research work in the Garden, especially regarding the possible transference of the hazel-bud-mite to the black-currant, which, when completed, will be published in the Society's JOURNAL. The want of a properly equipped research station is becoming daily more acutely felt.

The number of visitors to the Garden admitted by Fellows' tickets during the year 1905 amounted to 5,250. This number is exclusive of Horticultural parties, which were admitted by special arrangement, and would bring up the total to over 6,000.

32. Students.—Students are admitted to Wisley for a period of two years, and are trained in practical horticulture. Some of them also attend

ROYAL HORTICUL

ANNUAL REVENUE AND EXPENDITURE

Dr.

	£	s.	d.	£	s.	d.
To ESTABLISHMENT EXPENSES—						
Ground Rent	657	13	2			
Rates and Taxes	654	1	8			
Water Rate	48	17	6			
Electric Lighting	149	9	6			
Gas	10	9	1			
Hall Expenses	77	14	4			
Insurances	43	14	6			
						1,641 19 9
Salaries and Wages	1,339	13	3			
Printing and Stationery	654	18	9			
Postages	290	15	9			
Fuel	34	17	6			
Audit Fee	42	0	0			
Repairs	83	0	7			
Miscellaneous Expenses	290	5	1			
						2,735 10 11
						4,377 10 8
„ JOURNAL, PRINTING AND POSTAGE ...						1,211 15 3
„ DONATIONS TO KINDRED SOCIETIES ...						50 0 0
„ PAINTING ORCHID PICTURES... ..						30 15 0
„ BANK AND GENERAL INTEREST						52 16 7
„ LINDLEY LIBRARY						17 2 9
„ MOVING EXPENSES from Victoria Street ...						109 14 9
„ SHOWS and MEETINGS—						
Temple Show	682	2	7			
Chelsea Show	823	16	1			
Fruit Shows	261	4	3			
Labour	147	5	7			
Expenses of Floral Meetings and Conferences	109	7	4			
						2,023 15 10
„ PRIZES and MEDALS—						
Committee Awards &c.						674 16 11
„ WISLEY GARDENS—						
Rates and Taxes... ..	67	11	7			
Superintendent's Salary	225	0	0			
Labour	789	2	9			
Garden Implements, Manure, &c.	184	3	6			
Distribution of Plants	125	16	3			
Repairs	59	8	6			
Fuel	135	1	0			
Legal Expenses	15	17	10			
Miscellaneous Expenses	113	18	9			
						1,716 0 2
„ CHISWICK SCHOLARSHIP, 1904						31 5 0
„ BALANCE, carried to Balance Sheet						6,203 9 3
						£16,499 2 2

TURAL SOCIETY.

ACCOUNT for YEAR ending DECEMBER 31, 1905.

£ r.

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS	11,319	17	0			
„ LEGACIES	300	0	0			
„ ENTRANCE FEES	533	8	0			
„ DIVIDENDS	496	7	10			
„ SHOWS AND MEETINGS—						
Temple Show	1,505	6	11			
Chelsea Show	336	1	8			
Fruit Shows	157	14	11			
Takings at Hall Shows	276	3	6			
	—	—	—	2,275	7	0
„ JOURNALS—						
Advertisements	483	10	8			
Sale of Journals	73	4	10			
	—	—	—	556	15	6
„ HALL LETTINGS	717	13	6			
Less Expenses	51	12	5			
	—	—	—	666	1	1
„ PRIZES AND MEDALS				108	17	11
„ EXAMINATIONS in HORTICULTURE—						
Amount received in Fees	76	15	0			
Less Expended	44	17	6			
	—	—	—	31	17	6
„ WISLEY GARDENS—						
Produce sold	53	2	8			
Students' Fees	26	5	0			
Inspection of Gardens	103	10	2			
Miscellaneous Receipts	27	12	6			
	—	—	—	210	10	4

 £16,499 2 2

ROYAL HORTICUL

Dr.

BALANCE SHEET,

	£	s.	d.	£	s.	d.
To CAPITAL FUND ACCOUNTS—						
New Hall Building Fund	26,004	12	4			
Sale of Chiswick Lease, <i>less</i> Expenses ...	4,673	0	0			
Donations, Wisley	39	19	6			
Life Compositions—						
As at December 31, 1904 ...	£2,655	7	6			
Received since	491	2	0			
			3,146	9	6	
				33,864	1	4
„ SUNDRY CREDITORS				408	2	5
„ SUBSCRIPTIONS, &c., received in advance ...				353	9	6
„ LOAN (since repaid)				1,500	0	0
„ GENERAL REVENUE ACCOUNT—						
Balance, December 31, 1904	22,824	5	3			
Add Entrance Fees to						
December 31, 1904 ...	£426	6	0			
Less Bad Debts	4	11	2			
			421	14	10	
			23,246	0	1	
„ REVENUE FOR THE YEAR, as per annexed						
Account	6,203	9	3			
				29,449	9	4

 £65,575 2 7

TURAL SOCIETY.

DECEMBER 31, 1905.

Cr.

	£	s.	d.	£	s.	d.
By CAPITAL EXPENDITURE—						
„ NEW HALL AND OFFICES—						
As at December 31, 1904	34,166	10	6
Expenditure since	4,757	14	8
				38,924	5	2
„ FURNISHING THE HALL AND OFFICES—						
As at December 31, 1904	382	16	4
Expenditure since	1,378	0	10
				1,760	17	2
„ DWELLING HOUSES, WISLEY—						
As at December 31, 1904	1,690	0	0
Expenditure since	546	19	4
				2,236	19	4
„ GLASS HOUSES AND RANGES, WISLEY—						
As at December 31, 1904	2,932	17	8
Expenditure since	362	17	6
				3,295	15	2
				46,217	16	10
„ PLANT AND MATERIALS—						
Appliances for Shows	236	11	0
Fittings, Wisley	58	8	6
Horse and Cart, Wisley	37	0	0
Fencing and Wire Netting, Wisley	36	15	0
				368	14	6
„ SUNDRY DEBTORS...	423	2	2
„ INVESTMENTS—						
2½ % Consols, £10,586 13s. 11d.	cost	9,960	4	9
(£2,022 8s. 9d. of this sum is held by the Society, subject to the provisions of the will of the late J. Davis, Esq.)						
3 % Local Loan, £5,800	cost	6,006	16	6
Indian Rupee Paper, 37,000 Rupees	„	2,462	14	4
				18,429	15	7
<i>The approximate value of these Investments is £16,811.</i>						
„ CASH—						
At Bank	129	17	4
In Hand	5	16	2
				135	13	6
				£65,575	2	7

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on December 31, 1905.

ALFRED C. HARPER, F.C.A., Auditor (HARPER BROTHERS)
Chartered Accountant, 10 Trinity Square, E.C.

the Society's lectures and shows in the new Hall and elsewhere. A small horticultural library is attached to the Gardens for their use. Every opportunity and encouragement is given to students who use application, to master the whole of the general subject of practical horticulture, and as soon as a scientific department can be established elementary science as it affects horticulture will be added to the curriculum. More than 90 per cent. of the old garden-students are doing well. The Council are quite unable to meet the applications for energetic, trustworthy young men, but they *must all be workers*. During the past year applications were received for thirty-four head gardeners, seven single-handed gardeners, twelve foremen, nine journeymen, and for many miscellaneous men, such as nursery foremen, landscape gardeners, propagators, &c. In the great majority of cases the applicants were supplied with suitable men.

33. Distribution of Plants.—The Council wish to draw the attention of Fellows to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock which must either be given away or go to the waste heap. A few Fellows noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematise this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by ballot. The following points should therefore be borne in mind:—(1) It is only surplus plants which are available. (2) There is no pretence made of their being either valuable or rare, though undoubtedly some are not usually met with. (3) As a general rule they are only small plants.

Fellows travelling or having correspondents abroad are requested to forward to the Society any rare or curious seeds, cuttings, or plants they may have to spare.

34. The Meteorological Station.—The meteorological observations which were initiated in 1825 at the Chiswick Gardens, and are therefore the oldest series in the metropolitan area, are now being carried on at Wisley with a station which is regarded as one of the finest in the Kingdom as regards both its situation and its equipment. The annual records are published in the Society's JOURNAL.

35. Gifts to the Garden.—Besides the microscopes already mentioned, Mr. J. Willing has given a most useful waggonette; and in addition to the presentation by the leading nurserymen of the selections of fruit-trees mentioned in the last Annual Report, the Society has also received fine collections of flowering shrubs from the Director of the Royal Gardens, Kew, and from the following firms:—Messrs. Bunyard, Cripps, Jackman, Notcutt, R. Smith, Jas. Veitch, Anthony Waterer, and John Waterer. Representative Collections of Roses have been presented by Messrs. Bunyard, B. Cant, Frank Cant, Dickson's (Chester), A. Dickson, Mount, Paul (Cheshunt), Wm. Paul (Waltham Cross), Prince, and

Spooner. A number of plants and seeds have also been received from individual Fellows.

36. Committees, &c.—The Society continues to be deeply indebted to the Members of the Committees; to the writers of Papers communicated to the JOURNAL; to the Compilers of Abstracts; to the Examiners; and to others who by their self-denying work in its service have largely contributed to its present high position among the practical and scientific societies of the world.

37. Conclusion.—In concluding the Report for the past year and the forecast for 1906, the Council feel that they may justly congratulate the Society on being the most prosperous Royal Scientific Society in the Kingdom, the privileges of whose Fellows are in excess of those of any similar institution. At the same time they feel that what has been done in the past will be surpassed in the future, provided the Fellows do not relax their exertions, but rather make a renewed effort to wipe off the debt still remaining on the Hall, to complete the equipment of Wisley by the erection of a Horticultural Research Station, and to increase the Roll of Fellows to ten thousand by the end of the hundred-and-second year of the Society, which closes on March 6, 1906.

By Order of the Council,

W. WILKS, *Secretary*.

ROYAL HORTICULTURAL HALL,

VINCENT SQUARE, WESTMINSTER, S.W.

January 29, 1906.

GENERAL MEETING.

MARCH 6, 1906.

Mr. JOSEPH CHEAL in the Chair.

Fellows elected (106).—A. Alison, F. R. Armitage, The Hon. Mrs. G. Beckett, R. J. Black, G. Blundell, Rev. C. G. O. Bond, E. J. Bonvin, A. Burman, Mrs. W. Campion, Hugh A. Carter, H. S. H. Cavendish, Lady Chance, Miss M. G. Chance, Miss H. C. Chynoweth, J. B. Close-Brooks, Mrs. A. Cross, Mrs. P. Curtis, J. J. Daniels, Henry Allen Dawes, Mrs. Villiers Dent, Mrs. Le Mote Dickinson, Mrs. Dunbar-Buller, F. A. Edelsten, Miss A. M. Ellis, R. W. Farish, Mrs. W. Foley, A. Foster, E. Brien Gawne, J.P., Miss B. Glave, Miss F. Glave, M. Goodenough, Mrs. Hatfield Harter, Rev. T. L. G. Hassall, Mrs. B. Hayley, Lady Heygate, Mrs. Heyworth, David Hill, Right Hon. Lady Hillingdon, Mrs. T. Hodge, R. K. Hodgson, Mrs. C. S. Hunter, Mrs. Jennings, Mrs. H. Joachim, T. G. Judge, Mrs. Kemp, C. Ketten, Joseph Lambert, Mrs. F. Willington Lane, W. F. Laurie, Mrs. F. Lee, Mrs. Egerton Leigh, Miss Leslie, Marchioness of Londonderry, Mrs. I. A. S. Lovatt, Mrs. P. V. Luke, Wm. McLaren, Mrs. McLeod, Mrs. H. Mallock, F. W. Manson, H. Marshall, M. H. Matthew, F. H. Matthews, Miss C. A. Mitchell, Mrs. W. A. Mount, R. J. Mullings, Lady Henry Nevill, T. H. Newberry, Hon. W. P. North, Miss V. E. Oates, Sydney H. Osborne, G. McDougall Peche,

C. D. Phillips, J.P., Miss Proctor, F. H. Pyman, Miss B. Ramsay, R. Rankin, A. Rawlings, Miss E. M. Rawlins, Mrs. F. N. Reckett, Miss H. G. Robinson, Mrs. Scarfield, W. C. Scrivener, A. G. Sharpe, F. M. Shaw, Mrs. Silberberg, Mrs. E. A. Smith, Dr. E. A. Snell, Dr. E. Stainer, Mrs. D. Stewart, Mrs. W. E. Stobart, Lieut.-Col. E. F. Sullivan, Mrs. I. S. Swire, Mrs. Taylor, Mrs. H. Thompson, Lady Trendell, J. B. Treseder, J. G. Treseder, I. G. Treseder, Marchioness of Tweeddale, T. E. Waltham, P. R. Warren, Mrs. W. Watson, Mrs. G. F. Watts, Mrs. C. L. Whitaker, Mrs. Wren, Mrs. Wright-Anderson.

Fellows resident abroad (1).—Prof. Dr. Hans Schinz (Switzerland).

Associates (2).—Eugene Boytard, R. H. Browne.

Societies affiliated (7).—Blairgowrie and Rattray Horticultural Society, Bromley Common and District Cottagers Society, Ipswich District Gardeners and Amateurs Association, Kingsworthy and District Horticultural Society, Roehampton Cottage Garden and Horticultural Society, Ross-shire Rose Show, Tovil Working Men's Club Flower Show Society.

A lecture on "Garden Nomenclature" was given by Mr. G. W. Bulman (see p. 25).

GENERAL MEETING.

MARCH 20, 1906.

Sir JOHN T. DILLWYN-LLEWELYN, Bart., in the Chair.

Fellows elected (61).—M. Vaughan Archer, J. S. Arkwright, B.A., H. Ashley Barrett, Mrs. G. Bird, Miss A. M. Birkbeck, Mrs. R. Brassey, Major G. Bryan, H. F. Bulman, G. R. Burness, Mrs. W. Chamberlain, Mrs. Crompton, E. P. Cooper, Mrs. Vincent Cotterell, Mrs. J. W. Crombie, A. W. Crosse, The Earl of Darnley, Mrs. E. R. Debenham, J. R. Drummond, W. Emden, James Folds, Mrs. Wilson Fox, Mrs. F. Head, Mrs. Heath, Rev. H. Copinger Hill, Mrs. A. B. Horne, Deputy Surg.-Gen. Jeffcoat, Mrs. Kekewich, J. P. Kendall, Mrs. La Terrière, Mrs. Lithgow, Rev. John A. Lloyd, M.A., R. C. Long, Charles Louch, E. S. Mansfield, Miss Marcy, E. farington Matthews, W. A. Maud, Hy. Nicholls, Mrs. Oates, Miss H. B. C. Oertling, Mrs. J. E. Parish, Mrs. Pendarves, Alfred Perkins, A. E. Perkins, Charles Phillips, Lady du Plat, Mrs. Porcher, C. O. Ridley, Mrs. Roberts, John Robertson, Mrs. C. J. Rowe, Miss Saunders, G. Mackrill Smith, George H. Springall, H. S. G. Stephenson, Lady Stewart of Grantully, Lieut.-Col. J. Strachey, I.S.C., Mrs. G. P. Talbot, G. L. Venables, G. B. Wetherall, Miss Weyland.

Fellows resident abroad (2).—Henry Brett (New Zealand), Thos. Bentley Wilson (Transvaal).

Associates (2).—George Day, J. W. Lewis.

Societies affiliated (2).—Moidart Horticultural Society, Theale and District Gardening Association.

A lecture on "Parasites and Saprophytes among Flowering Plants," illustrated by lantern slides, was given by the Rev. Prof. G. Henslow, M.A. V.M.H. (see p. 37).

COLONIAL FRUIT SHOW.

MARCH 22, 23, AND 24, 1906.

LIST OF JUDGES.

Bunyard, George, V.M.H.	Pearson, A. H.
Hudson, James, V.M.H.	Tillman, H. E.
Walker, A. M.	Monro, G., V.M.H.
Garcia, M. J.	Fielder, C. R.
Wilks, Rev. W., M.A.	Butt, G. F.

AWARDS.

Gold Medal.

The Army & Navy Auxiliary Co-operative Supply, Ltd., for a collection of fruit.

H. O. Arton, Esq., for a collection of fruit.

The Cape Orchard Co., for a collection of fruit.

The Rhodes Fruit Farm, for a collection of fruit.

Silver-gilt Knightian Medal.

A. B. de Villiers, Esq., for Grapes and Pears.

The West Indian Produce Association, for preserves, Limes, &c.

The British South Africa Co., for products of Rhodesia, pictures, &c.

J. D. Joubert, Esq., for Apple and Pears.

Messrs. K. M. Naidoo & Co., for Grapes, Apples, Pears, Melons, and Plums.

W. H. Lategan, Esq., for Melon and Grapes.

The Donkerhoek Fruit Syndicate, for Prunes.

O. C. M. Barry, Esq., for Grapes, Plums, Peaches, &c.

Silver-gilt Banksian Medal.

C. F. Pfeiffer, Esq., for Grapes.

N. J. Basson, Esq., for Grapes.

H. W. Hawkins, Esq., for Grapes.

The British South Africa Co., for Rhodesian tobacco.

T. Micklem, Esq., for Grapes and Pears.

J. Smuts, Esq., for Grapes.

The Army & Navy Co-operative Society, Ltd., for preserves.

Silver Flora Medal.

Mrs. G. Green, for water-colour paintings of the Victoria Falls.

Silver Knightian Medal.

J. Samut, Esq., for Oranges.

Messrs. G. North & Son, for Pineapples.

A. W. Gardner, Esq., for Grape Fruit.

Silver Banksian Medal.

Miss Dacres, for pictures of the Cape flora.

D. A. English, Esq., for Pears.

J. Leighton, Esq., for Apples.

The Malta Horticultural Society, for Oranges.

Messrs. G. & B. Hutchinson, for Pears.

G. L. Lucas, Esq., for Pineapples.

The French Flint Glass Bottle Co., for a patent screw preserving bottle.

Bronze Knightian Medal.

E. F. Coke, Esq., for Lemons.

E. Muirhead, Esq., for Oranges and Grape Fruit.

Bronze Banksian Medal.

A. C. Buller, Esq., for Pears and Plums.

F. Weinholt, Esq., for Apples.

J. Hayes, Esq., for Pears and Quinces.

Messrs. Shepherd Bros., for jams and bottled fruits.

The Cape of Good Hope Government, for Raisins.

A. Nicholson, Esq., for Peaches.

The Western Province Preserving Co., for bottled fruits.

GENERAL MEETING.

APRIL 3, 1906.

Mr. A. H. PEARSON in the Chair.

Fellows elected (62).—J. W. Baines, W. J. Bean, Mrs. A. Dunlop Best, Mrs. Booth, Lady Bosanquet, G. A. Box, F. Bridger, Isaac Bunting, H. Burton, Mrs. M. Callaghan, H. Clymer, Mrs. Cock, Temple Cook, Mrs. G. T. Crane, Mrs. W. O. Danckwerts, Viscount Enfield, Mdme. Gennadius, C. S. Gilman, G. P. Glendinning, H. W. Grace, Mrs. H. Gray, Mrs. C. Green, Mrs. C. E. Green, Miss S. S. Greenway, Mrs. R. Hampson, Frank Hawker, Mrs. F. W. F. Hervey, Mrs. G. Hervey, J. Earle Hodges, H. W. S. Hunt, Leon Hymans, W. G. Salthouse Hynde, Captain L. P. Irby, Mrs. Jay, Thomas Kent, F. L. Gaye King, J. H. King, Mrs. C. Latter, Mrs. H. D. Livingstone, Mrs. Manning, A. E. Mason, Rev. Principal K. Moore, Mrs. Pattullo, E. Penman, T. H. Phipps, Mrs. Martin Pirie, C. H. Reynolds, J. Charsley Roberts, H. R. Sadler, T. E. Smiles, Horatio Stephens, A. J. Taylor, J. C. M. Taylor, C. D. Thielbaut, Mrs. C. M. Tuke, Albert E. Vidler, Mrs. Warburton, J. B. Warriner, Arthur Weekes, Mrs. A. E. Whitfield, Mrs. S. Williams, Arthur C. Wombwell.

Fellows resident abroad (2).—George Brouckart (Belgium), J. C. Lane (New Zealand).

Societies affiliated (3).—Guildford and District Gardeners' Mutual Improvement Association; Radlett, Aldenham, and Letchmore Heath Horticultural Society; Tooting, Balham, Merton, and Mitcham Horticultural Society.

A lecture on the "Opening of Flowers," illustrated by the Kammato-graph, was given by Mrs. Scott (see p. 48).

GENERAL MEETING.

APRIL 17, 1906.

Mr. W. A. BILNEY in the Chair.

Fellows elected (45).—A. J. Addis, E. L. Arnbrecht, Mrs. F. W. Baker, Mrs. Stephen Batson, Mrs. Bradshaw, Arthur Cardew, G. L. Courthope, M.P., Mrs. Croll, John M. Denny, F. Dixon-Brown, G. B. Dodwell, E. Doncaster, J. H. Donne, Mrs. R. W. Gordon, Hon. Beatrice Goschen, Hon. Fanny Goschen, Mrs. Hamilton, W. Harrow, Mrs. E. Hubbock, Hon. Lady Hulse, Henry J. Keen, N. Langton, W. H. Lees, Major R. C. Luard, Mrs. Felix Ludlam, Miss V. Masterman, C. P. Maw, Mrs. Merriman, Miss Mount, P. E. Noble, Mrs. J. Northcote, Mrs. C. Parsons, Miss Pease, T. E. Reed, Mrs. E. Rosenberg, Alphonse Smets, J. H. Sutcliffe, Sir William Taylor, Henry Tozer, A. C. Turner, Miss E. Turner, Mrs. M. Waldron, Miss Warburton, W. Wilson, J. Forbes Woodhouse.

Society affiliated (1).—Copythorne, Munstead, and Netley Marsh Horticultural Society.

A Lecture on "Colour Photography in Horticulture," illustrated by lantern slides, was given by Mr. F. Enock.

GENERAL MEETING.

MAY 1, 1906.

Mr. GEORGE BUNYARD, V.M.H., in the Chair.

Fellows elected (69).—Major Oswald Ames, Mrs. E. -C. Barker, Miss O. Barneley, R. G. Barnes, Hon. Mrs. Bevan, Arthur Brampton, F. C. Bramwell, Miss M. V. Brown, Mrs. C. E. Browne, B. F. Browning, Thos. Bunyard, Miss Burrows, Mrs. E. Crauford, John Crawter, Mrs. Cripps, — Crone, Hon. Elinor Daly, Mrs. A. Davies, Benjamin Davies, Lady Pauncefort Duncombe, E. E. Dunn, Mrs. H. W. Ethelston, Mrs. R. Fernie, Mrs. S. Flemming, Miss Alice Gair, W. J. Garner, Mrs. S. Bromley Garrard, P. T. Glanville, W. Hancke, Ebenezer Harris, Mrs. E. Rhodes Harrison, Lieut.-Col. C. Heseltine, A. E. Hoare, J. S. Hogan, Mrs. Hornby, C. E. Jones, Mrs. R. B. Maconochie, F. Mansfield, H. G. Maurice, Miss O. M. Mendel, C. E. Murrells, J. Newstead, Col. J. Nicholson, C.M.G., C. G. Payne, H. E. Pennett, Miss J. M. Powell, C. Price, — Rasmussen, Mrs. T. A. Rickman, G. C. Ronchetti, Miss B. Rooper, F. S. Saunders, Miss S. E. G. Saunders, W. Saw, Henry Seller, Mrs. F. C. Selous, G. Colin Sharp, Mrs. Caldecott Smith, Miss G. Stebbing, Mrs. W. Taylor, Miss M. A. Thompson, Mrs. Upton, C. Victors, Mrs. H. Walton, Capt. R. Waring, R.A., A. J. Warren, G. H. White, Miss J. B. Whitelaw, Miss K. Wood.

Fellows resident abroad (2).—C. A. Simmonds (Transvaal), S. Nishi (Japan).

Associate (1).—Miss Nora Lucas.

Society affiliated (1).—Kingsbridge and District Horticultural Society.

A Lecture on "Phenology as an Aid to Horticulture," illustrated by lantern slides, was given by Mr. E. Mawley, V.M.H. (see p. 52).

GENERAL MEETING.

MAY 15, 1906.

Mr. ALEXANDER DEAN in the Chair.

Fellows elected (82).—Mrs. Adlard, A. Douglas Ainslie, Mrs. Alsop, G. P. Baker, Hon. Mrs. Guy Baring, H. Barlow, T. L. Barrett, Mrs. B. F. Barton, A. I. Belisha, Miss E. S. Besant, C. H. Bingemann, P. L. Browne, Mrs. J. Burkenshaw, Gerard D. E. Chapman, Mrs. J. Corrie, J. Couran, Mrs. F. C. Coxhead, Miss E. Crowe, Viscount Dalrymple, Alfred Denny, T. C. Dewey, C. B. de Witt, John A. Drewett, W. R. Dykes, John F. Edell, John Elliott, J.P., Mrs. Welby Everard, Miss Fox, Wm. H. Green, E. S. Hawkins, J. S. Hayercroft, Mrs. Heimpel, E. P. Howard, Mrs. E. P. Howard, W. Johnston, W. Jones, G. E. B. Kennedy, J. Kerr, R. O. Kerrison, Capt. the Hon. L. F. King-Noel, F. Lazenby, Lady Letchworth, W. H. Lever, Lady Lindsay-Hogg, J. J. Litchfield, Lady Gwendolen Little, I. R. D. Lynn, J. P. Mead, Mrs. J. Morten, Mrs. R. Morten, Miss E. H. Onslow, Mrs. Orr, Miss M. E. Palmes, Capt. F. S. Pelham, R.N., Miss Philips, F. M. Prince, Mrs. H. Raphael, Miss E. Reid, Mrs. H. R. Robertson, Mrs. J. B. Samuel, Mrs. E. P. Simpson, A. Smallwood, Mrs. Dudley Smith, Mrs. G. Smith, G. W. S. Sparrow, Mrs. Evan Spicer, F. C. Stacey, Miss C. F. Stephens, Miss Stracey-Clitherow, Mrs. F. Sykes, Mrs. C. Telford-Smith, John Thynne, Carlston F. Tufnell, Mrs. J. H. Veitch, Miss Waller, Miss F. Waller, J. C. Walters, Miss T. Waterhouse, F. Cowper Webb, Mrs. Welby-Everard, J. W. West, Mrs. Wigram.

Fellows resident abroad (3).—W. J. Hardijzer (Holland), Baron Victor von Pelken (Italy), N. C. Neogy (India).

Associates (3).—Miss E. James, Miss W. Peake, Miss M. Ricardo.

Societies affiliated (2).—Burnham, Taplow, and Hitcham Horticultural Society; Wimborne and District Gardeners' Association.

A Paper on "Flower Gardens in the United States," by Prof. Corbett, was read by the Assistant Secretary (see p. 58).

THE TEMPLE SHOW, 1906.

JUDGES.

ORCHIDS.

Bilney, W. A.
Chapman, H. J.
Fowler, J. Gurney
Little, H.

ROSES.

Jefferies, W. J.
Jennings, John
May, H. B.
Shea, C. E.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.
McIndoe, J., V.M.H.
Pearson, A. H.
Poupart, W.

GROUPS IN OPEN AIR.

Chapman, A.
Crump, W., V.M.H.
Nicholson, Geo., V.M.H.
Thomson, D. W.

HERBACEOUS, ROCK PLANTS AND
ALPINES.

Beckett, E., V.M.H.
Goodwin, A. R.
Lynch, R. Irwin, V.M.H.
Thomas, Owen, V.M.H.

FOLIAGE PLANTS.

Bain, W.
Hudson, J., V.M.H.
Ker, R. Wilson
McLeod, J. F.

FLOWERING PLANTS.

Fielder, C. R.
Howe, W.
Paul, G., V.M.H.
Salter, C. J.

MISCELLANEOUS.

Dixon, C.
Douglas, Jas., V.M.H.
Notcutt, R. C.
Odell, J. W.

SPECIAL AND VEITCHIAN CUP.

Colman, Jeremiah
Gibson, Jas.
Holford, Major, C.V.O.
Lawrence, Sir Trevor, V.M.H.

Methven, J.
Veitch, P. C. M.
Whytock, Jas.

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

Veitchian Cup, value Fifty-five Guineas.

Messrs. F. Sander & Sons, St. Albans, for Orchids, and new and rare plants.

Gold Medal.

His Grace the Duke of Portland, Welbeck Abbey, Worksop (gr. J. Gibson), for vegetables.

J. Colman, Esq., Gatton Park, Reigate (gr. W. P. Bound), for Orchids.

Messrs. Charlesworth & Co., Heaton, Bradford, for Orchids.

Messrs. W. Cutbush & Son, Highgate, N., for rock garden, clipped trees, Carnations, &c.

To Messrs. Fisher, Son, & Sibray, Limited, Handsworth, Sheffield, for ornamental trees and shrubs.

To Messrs. R. P. Ker & Sons, Basnett Street, Liverpool, for Hippeastrums.

To Mr. George Mount, Rose Nurseries, Canterbury, for Roses.

To Messrs. W. Paul & Son, Royal Nurseries, Waltham Cross, for Roses.

To Messrs. F. Sander & Sons, St. Albans, for Orchids, and new and rare plants.

To Messrs. Sutton & Sons, Reading, for greenhouse plants and vegetables.

To Messrs. R. Wallace & Co., Colchester, for Lilies, hardy perennials, and aquatics.

To Messrs. J. Veitch & Sons, Limited, Chelsea, for new Chinese plants, stove and greenhouse plants.

Silver Cup.

To Sir W. G. Pearce, Bart., Chilton Lodge, Hungerford (gr. C. Beckett), for a collection of fruit.

To Sir F. Wigan, Bart., Clare Lawn, East Sheen, S.W. (gr. W. H. Young), for Orchids.

To Martin R. Smith, Esq., Hayes, Kent (gr. C. Blick), for Carnations.

To W. D. James, Esq., West Dean Park, Chichester (gr. W. H. Smith), for Carnations.

To A. F. Walter, Esq., Bearwood, Wokingham (gr. W. Barnes), for Apple and Melons.

To Messrs. Bakers, Wolverhampton, for Pelargoniums, Pansies, &c.

To Messrs. Barr & Sons, King Street, Covent Garden, for hardy flowers, miniature trees, &c.

To Messrs. G. Bunyard & Co., Maidstone, for a collection of fruit and hardy perennials.

To Messrs. Blackmore & Langdon, Tiverton-on-Avon, Bath, for Begonias.

To Messrs. F. Cant & Co., Braiswick Nursery, Colchester, for Roses.

To Messrs. H. Cannell & Sons, Swanley, Kent, for Cannas, Gloxinias, Calceolarias, Roses, &c.

To Messrs. J. Carter & Co., High Holborn, W.C., for Schizanthus, Begonias, Cinerarias, Gloxinias, Calceolarias, &c.

To Messrs. J. Cheal & Sons, Crawley, for ornamental trees, Rhododendrons, Azaleas, &c.

To Messrs. T. Cripps & Son, Tunbridge Wells, for Japanese Acers.

To Messrs. R. & G. Cuthbert, Southgate, N., for Azaleas.

To Messrs. H. Low & Co., Enfield, N., for Orchids.

To Mr. H. B. May, Upper Edmonton, N., for Ferns and flowering plants.

To Messrs. Paul & Son, Cheshunt, Herts, for Roses.

To Mr. Amos Perry, Winchmore Hill, N., for hardy flowers and Nymphaeas.

To Mr. M. Prichard, Christchurch, Hants, for rock plants and hardy flowers.

To Messrs. T. Rivers & Son, Sawbridgeworth, Herts, for fruit trees in pots.

To Mr. L. Russell, Richmond, Surrey, for ornamental trees and flowering plants.

To Mr. D. Russell, Brentwood, Essex, for ornamental trees and shrubs, Azaleas, Lilacs, &c.

To Messrs. R. Smith & Co., Worcester, for Clematis, Conifers, Acers, Azaleas, and hardy flowers.

To Messrs. J. Waterer & Son, Limited, American Nursery, Bagshot, for Rhododendrons, Japanese Acers, &c.

Silver-gilt Flora Medal.

To the Hon. Walter Rothschild, Tring Park, Herts (gr. Mr. Dye), for Carnations.

To Mr. George Arends, Ronsdorf, Germany, for Primulas.

To Messrs. J. Backhouse & Son, Limited, York, for rock plants &c.

To Mr. A. J. A. Bruce, Chorlton-cum-Hardy, for Sarracenias.

To Messrs. W. Bull & Sons, King's Road, Chelsea, for Orchids, foliage plants, &c.

To Messrs. J. Cypher & Sons, Cheltenham, for Orchids.

To Messrs. Dobbie & Co., Rothesay, N.B., for Pansies, Sweet Peas, and Aquilegias.

To Mr. C. Engelmann, Saffron Walden, for Carnations.

To Mr. Reginald Farrer, Ingleborough, Lancaster, for choice alpiners.

To Messrs. W. Fromow & Son, Chiswick, W., for Japanese Maples.

To Messrs. J. Hill & Son, Lower Edmonton, for Ferns.

To Messrs. G. Jackman & Son, Woking, for hardy herbaceous plants.

To Le Lion Établissement Horticole, 122 Rue Heyveld, Mont St. Amand, for *Cocos Weddelliana* and *Phœnix Roebelenii*.

To Mr. H. C. Pulham, Elsenham, Essex, for alpine and rock plants.

To Mr. G. Reuthe, Keston, Kent, for herbaceous plants and rare shrubs.

To Mr. C. Turner, Royal Nurseries, Slough, for Roses and Carnations.

To Messrs. T. S. Ware, Limited, Feltham, for Begonias, Carnations, Roses, &c.

Silver-gilt Knightian Medal.

To the University College, Reading (gr. Mr. C. Foster), for vegetables.

Silver-gilt Banksian Medal.

To Mr. A. F. Dutton, Iver, Bucks, for Carnations.

To Messrs. Hobbies, Limited, Dereham, Norfolk, for Roses.

To Messrs. Hogg & Robertson, Mary Street, Dublin, for Tulips.

To Mr. S. Mortimer, Rowledge, Farnham, for Carnations, Tomatoes, and Cucumbers.

To Mr. R. C. Notecutt, Woodbridge, Suffolk, for flowering shrubs and hardy flowers.

Silver Lindley Medal.

To M. Ch. Vuylsteke, Loochristi, Ghent, for Orchids.

Silver Flora Medal.

To Sir A. Henderson, Bart., Buscot Park, Faringdon (gr. Mr. W. L. Bastin), for Codiaëums.

To R. Ashworth, Esq., Ashlands, Newchurch, Manchester (gr. Mr. Pidsley), for Orchids.

To Mrs. Collingwood, Lilburn Tower, Alnwick (gr. Mr. W. Lovett), for Orchids.

To Mr. Ernest Hills, Redleaf, Penshurst (gr. Mr. G. Ringham), for Orchids.

To Messrs. R. H. Bath, Limited, Wisbech, for Tulips and Sweet Peas.

To Mr. H. Burnett, Forest Road, Guernsey, for Carnations.

To Messrs. B. R. Cant & Sons, Old Rose Gardens, Colchester, for Roses.

To Mr. Henry Eckford, Wem, Salop, for Sweet Peas.

To Mr. W. J. Godfrey, Rolle Street, Exmouth, for Oriental Poppies, Pelargoniums, Verbenas, &c.

To Mr. H. J. Jones, Ryeeroft Nursery, Lewisham, S.E., for Sweet Peas and Pelargoniums.

To Messrs. Kelway & Son, Langport, Som., for Pæonies, Delphiniums, and Pyrethrums.

To Messrs. B. Ladhams, Limited, Shirley, Southampton, for hardy flowers.

To Messrs. J. Laing & Son, Forest Hill, S.E., for Begonias, Caladiums, and Streptocarpus.

To Mr. A. R. Upton, Hardy Plant Nursery, Millmead, Guildford, for alpine and rock plants.

To Mr. A. M. Wilson, East Keal, Spilsby, Lincs., for Cottage and Darwin Tulips.

Silver Knightian Medal.

To Messrs. J. & F. Chatfield, Southwick, for Strawberries.

To Mr. R. Stephenson, Burwell, Cambridge, for Asparagus.

Silver Banksian Medal.

To Messrs. Bell & Sheldon, Guernsey, for Carnations.

To Mr. C. W. Breadmore, Winchester, for Sweet Peas.

To Messrs. Carter Page & Co., London Wall, E.C., for Cactus Dahlias.

To Messrs. G. & A. Clark, Dover, for hardy flowers, rock plants, and Pelargoniums.

To Mr. Howard H. Crane, Woodview Terrace, Highgate, N., for Violas.

To Messrs. A. Dickson & Sons, 55 Royal Avenue, Belfast, for Tulips.

To Mr. Byron Gayford, Worthing, for Grapes, Tomatoes, and Cucumbers.

To Messrs. J. T. Gilbert & Son, Dyke, Bourne, Lincs., for Anemones and hardy flowers.

To Mr. A. J. Harwood, St. Peter's Street, Colchester, for Asparagus.

To the Misses Hopkins, Knutsford, Cheshire, for hardy plants.

To the Horticultural College, Swanley (gr. Mr. Lawson), for vegetables.

To Mr. W. Iceton, Putney, S.W., for Lilies, foliage and flowering plants.

To Mr. T. Jannoch, Dersingham, Norfolk, for Lilac and Lilies of the Valley.

To Messrs. Laxton Bros., High Street, Bedford, for Strawberries.

To Messrs. J. Peed & Son, West Norwood, for Caladiums, alpine and herbaceous plants.

To Messrs. Reamsbottom & Co., Geashill, King's County, Ireland, for Anemones.

To Mr. R. Sydenham, Tenby Street, Birmingham, for Sweet Peas and Spanish Irises.

To Messrs. Watkins & Simpson, 12 Tavistock Street, W.C., for Sweet Peas.

COLONIAL FRUIT SHOW.

JUNE 6 AND 7, 1906.

JUDGES.

George Bunyard, V.M.H.

Alexander Dean, V.M.H.

George Monro, V.M.H.

A. H. Pearson

H. E. Tillman

C. R. Fielder

LIST OF AWARDS.

Gold Medal.

To the Government of South Australia, for fruit.

To the Victorian Government, Australia, for fruit and vegetables.

To the Transvaal Government, South Africa, for Citrus fruits.

Silver-gilt Knightian Medal.

To the New Zealand Government, for a collection of Apples.

To the New South Wales Government, Australia, for a collection of fruit.

Silver Knightian Medal.

To the Natal Government, South Africa, for a collection of fruit.

To Dr. Benjafield, Hobart, Tasmania, for Apples and Pears.

To H. H. Wettenhall, Esq., Victoria, Australia, for Apples.

To A. H. Malan, Esq., Pretoria, South Africa, for Citrus fruits.

To the Frimley Fruit Canning Factory, Hastings, New Zealand, for Citrus fruits.

To Messrs. S. Kirkpatrick & Co., Ltd., Nelson, New Zealand, for preserved fruits, jams, &c.

To the Royal Mail Steam Packet Company, 18 Moorgate Street, London, E.C., for a collection of fruit.

To F. Victor Chalmers, Esq., Devonshire Square, London, E.C., for West Indian and Royal Navy tobacco.

To Lady Plowden, Aston Rowant, Oxon., for a collection of fruit.

Silver Banksian Medal.

To the British West India Fruit Company, 15 Seething Lane, London, E.C., for Bananas &c.

To the West Indian Produce Association, 4 Fenchurch Buildings, London, E.C., for a collection of fruit, preserves, &c.

To the Government of West Australia, for a collection of Apples.

To the Ramie Mills, Ltd. (Manager, D. Edwards Radclyffe), Staines, for Ramie fibre.

To E. T. L. Edmeades, Esq., Oudtshoorn, South Africa, for Walnuts.

To Samuel Marks, Esq., Pienaars Poort, Hatherley, South Africa, for Citrus fruits.

To J. McCord, Esq., Warm Baths, Transvaal, South Africa, for Citrus fruits.

To Piet Potgieter, Esq., Warm Baths, Transvaal, South Africa, for Citrus fruits.

To Karl Potgieter, Esq., Warm Baths, Transvaal, South Africa, for Citrus fruits.

To H. L. Potgieter, Esq., Buffelskloof, Oudshoorn, South Africa, for Almonds.

To J. P. Hamman, Esq., Worcester, Cape Colony, South Africa, for Sultanias.

To A. P. Hamman, Esq., Worcester, Cape Colony, South Africa, for Raisins and Currants.

To T. Shepstone, Esq., Piet Potgieter's Rust, Transvaal, South Africa, for Citrus fruits.

Award of Merit.

To Orange 'Transvaal Seedling,' exhibited by J. McCord, Esq., Warm Baths, Transvaal, South Africa.

GENERAL MEETING.

JUNE 12, 1906.

Sir JOHN T. DILLWYN-LLEWELYN, Bart., in the Chair.

Fellows elected (101).—Thos. Allsop, James Arthur, Mrs. G. Barbour, Mrs. H. Bell, R. Bence-Jones, Bernhard W. Bentineck, Miss Birch, F. Blundell, H. D. Blyth, T. Brown, W. A. Buchanan, Stanley D. Buott, W. W. Butler, Miss M. Carr, E. H. Cartwright, Victor Cavendish, M.P., A. Chalcraft, M. B. C. Church, Mrs. G. Clark, W. J. Colwill, H. L. Cooper, Col. Cotton-Jodrell, Mrs. Cunninghame, Mrs. Spedding Curwen, Mrs. Cuthbertson, C. W. Davis, Hon. Richard Dawson, John Dawson, Miss M. Dyke, Howard Elliott, Mrs. M. R. Ellis, Mrs. Lewis Evans, Mrs. Fletcher, James Forbes, Hon. George Fox, Miss L. A. Gandy, Miss R. M. Goody, Mrs. J. Lesmoir Gordon, Mrs. H. D. Greene, Miss B. Haig, Lionel Hanbury, Miss Harker, Walter Hartle, Mrs. E. Heseltine, Mrs. F. Hicks, E. W. Hill, Mrs. Emslie Horniman, W. Hughes, Miss Lily Hughes Jones, Miss W. Jervoise, F. H. King, John Kyffin, F. W. Ladds, F. Lawson, Mrs. Lee, Mrs. E. Lloyd-Williams, N. MacGregor, Major W. Mackay, C. E. Martin, J. G. Martin, Capt. Aymer Maxwell, W. May, Mrs. G. W. Medley, W. P. Metcalfe, Mrs. R. Miller, J. W. Montford, W. Morgan, Mrs. Morris, W. Munt, Walter Parrott, Richard Phillips, Maurice Portal, Miss E. L. Ramsay, Edgar Reeve, J. Richardson, Mrs. E. J. Richardson, F. H. Rivington, T. E. Robarts, H. G. Rose, Miss E. Sands, Miss M. R. Seligman, J. R. Smith, R. Stanway, Mrs. A. I. Stedman, H. W. Stevens, Mrs. W. C. Symes, Mrs. Terry, Sir William Hood Treachen, Miss Turner, Miss F. C. Vallentin, S. G. Ward, Mrs. G. Warren, Dendy Watney, Mrs. Whatton, E. Wheldon, Emanuel Wills, Major C. E. W. Wood, Mrs. A. H. Wood, H. A. Woodbridge, G. M. Woodrow, H. H. Worthington.

Fellows resident abroad (7).—E. Cleverly (France), Oscar Fanyan (France), R. G. Girard (Calcutta), A. L. Holtze (South Australia), D. A. Koster (Holland), G. J. van Waveren (Holland), F. E. Wienholt (Rhodesia).

Associates (3).—F. Hook, F. Siney, J. Wadham.

Societies affiliated (3).—Abinger and District Gardeners' Association, Stour Valley Gardening Society, Western Province Agricultural Society.

A Lecture on "Tea and the Tea Plant," illustrated by lantern slides, was given by Sir George Watt, C.I.E. (see p. 64).

EXHIBITION OF DECORATED TABLES, VASES, BOUQUETS, &c.

JUNE 20, 1906.

LIST OF AWARDS.

Gold Medal.

Messrs. Perkins and Sons, Warwick Road, Coventry.

Silver-gilt Flora Medal.

W. Hayward, 57 Fife Road, Kingston-on-Thames.

Silver-gilt Banksian Medal.

Miss F. Harwood, 16 St. Peter Street, Colchester.

Silver Flora Medal.

Miss Anstey, Knight's Hill Road, West Norwood.

Mrs. Beckett, Aldenham House Gardens, Elstree.

Mrs. C. Williamson, Wilstead, Ethelbert Road, Canterbury.

W. Treseder, The Nurseries, Cardiff.

Silver Banksian Medal.

Miss L. King, Abbeydale, Coggeshall.

C. Becht, Cam House Lodge, Campden Hill, W.

G. D. Clark, The Nurseries, Dover.

G. H. Sage, 71 Manor Road, Richmond, Surrey.

R. Edwards, The Gardens, Beechy Lees, Sevenoaks.

Miss Easterbrook, The Briars, Fawkham, Kent.

W. J. Pritchard, High Street, Elstree.

Mrs. Brewster, 12 St. Peter's Street, Canterbury.

Bronze Flora Medal.

Miss M. D. Watson, 17 Lansdown Parade, Cheltenham.

Bronze Banksian Medal.

Miss A. E. Coles, The Grove, Pinner, Middlesex.

The Grosvenor Floral Company, 39 Chapel Street, Belgrave Square, S.W.

Miss K. I. Sedgwick, 72 King Edward's Gardens, Acton Hill, W.

Edwin Beckett, V.M.H., Aldenham House Gardens, Elstree.

GENERAL MEETING.

JUNE 26, 1906.

The Hon. JOHN R. DE C. BOSCAWEN in the Chair.

Fellows elected (66).—F. Armstrong, S. Atkinson, T. H. Atkinson, Miss C. Barron, Charles Brooks, J. B. Boote, P. B. Burgoyne, Mrs. Burnett, E. P. Calvert, Hon. Mrs. Campion, J. M. Chandler, Mrs. J. J. Chapman, J. H. Clayton, C. Costeller, Mrs. E. Cutbill, Mrs. L. M. Darra Mair, E. Davies, J. de Meyier, Mrs. A. Denny, Charles Derby, Mrs. A. Drake, Justus Eck, G. W. Fahrion, J. Vesey FitzGerald, K.C., Mrs. H. Fletcher, Mrs. Flury, Dr. J. Kingston Fowler, I. H. K. Fowler, Mrs. A. Gold, G. Harris, Edwin Hart, John Higham, Frank Hird, Edward Hughes, Miss Alice Hughes, R. St. John Hughes, Mrs. H. Illingworth, W. H. Jessop, James Kelway, C. Lamb, Walter Lethbridge, Mrs. V. A. Litkie, J. L. Luddington, James McDonald, His Grace the Duke of Northumberland, Mrs. Osmaston, Mrs. Oswald, Dr. E. S. Pasmore, Mrs. G. D. Paton, Col. J. G. Pilcher, Lady Portal, H. Addis Price, Mrs. Pringle, Alex. Rea, the Right Hon. the Earl of Romney, Countess of Romney, Russell Scott, Miss Shillito, Miss E. M. Smith, Mrs. G. E. Trechmann, S. Tryon, Miss H. Tucker, R. E. Turner, Mrs. F. Williams, J. D. Williams, F. Wyer.

A Lecture on "Remarkable Cases of Adaptation to the Conditions of Life," illustrated by lantern slides, was given by the Rev. Prof. G. Henslow, V.M.H. (see p. 97).

HOLLAND HOUSE SHOW, 1906.

JULY 10 AND 11.

JUDGES.

ORCHIDS.

Bilney, W. A.
Chapman, H. J.
Fowler, J. Gurney
Little, H.

ROSES.

Goodwin, A. R.
Philbrick, Miss
Willmott, Miss, V.M.H.

FRUIT AND VEGETABLES.

Challis, T., V.M.H.
McIndoe, J., V.M.H.
Pearson, A. H.
Poupart, W.

GROUPS IN OPEN AIR.

Chapman, A.
Douglas, J., V.M.H.
Jennings, John

HERBACEOUS, ROCK AND ALPINE PLANTS.

Bennett-Poë, J. T., V.M.H.
Divers, W. H.
Pearson, C. E.
Shea, Chas. E.

FOLIAGE PLANTS.

Bain, W.
Fielder, C. R.
Ker, R. Wilson
McLeod, J.

FLOWERING PLANTS.

Bates, W.
 Howe, W.
 Reynolds, G.
 Turner, Arthur

MISCELLANEOUS.

Dixon, C.
 Nicholson, G., V.M.H.
 Turner, T. W.

IMPLEMENTS AND SUNDRIES.

Beckett, E., V.M.H.	Mortimer, S.
Gibson, J.	

AWARDS GIVEN BY THE COUNCIL AFTER CONSULTATION WITH THE JUDGES.

The order in which the names are entered under the several medals and cups has no reference whatever to merit, but is purely accidental.

The awards given on the recommendation of the Fruit, Floral, and Orchid Committees will be found under their respective reports.

Gold Medal.

Lord Llangattock, The Hendre, Monmouth (gr. T. Coomber), for fruit.
 Messrs. W. Cutbush & Son, Highgate, for group of plants.

Mr. H. B. May, Upper Edmonton, for Ferns, foliage, and flowering plants.

Messrs. T. Rivers & Son, Sawbridgeworth, for fruit trees in pots.

Messrs. F. Sander & Sons, St. Albans, for Orchids.

Sherwood Cup.

Mr. H. B. May, Upper Edmonton, for group of miscellaneous plants.

Silver Cup.

Sir F. Wigan, Bart., Clare Lawn, East Sheen (gr. W. H. Young), for Orchids.

Jeremiah Colman, Esq., Gatton Park, Reigate (gr. W. P. Bound), for Orchids.

S. Heilbut, Esq., Holyport, Maidenhead (gr. J. B. Westropp), fruit trees in pots.

J. Bradshaw, Esq., The Grange, Southgate (gr. Whitelegge), for hardy flowers.

Messrs. G. Bunyard & Co., Maidstone, for hardy flowers, orchard house trees and fruit.

Messrs. J. Carter, High Holborn, for Peas &c.

Messrs. W. Paul & Sons, Waltham Cross, for Roses.

Messrs. Paul & Son, Cheshunt, for Roses and hardy flowers.

Messrs. B. R. Cant & Son, Colchester, for Roses.

Messrs. F. Cant & Co., Colchester, for Roses.

Messrs. Blackmore & Langdon, Twerton Hill, Bath, for Begonias.

Messrs. R. Wallace & Co., Colchester, for herbaceous and bulbous plants.

Messrs. J. Hill & Son, Lower Edmonton, for rare Ferns.

Messrs. Gunn & Sons, Brookfield Nursery, Olton, for Phloxes.

Messrs. Charlesworth & Co., Heaton, Bradford, for Orchids.

Messrs. R. & G. Cuthbert, Southgate, for miscellaneous plants.

Messrs. T. S. Ware, Ltd., Feltham, for Begonias, Carnations, and hardy flowers.

Mr. M. Prichard, Christchurch, for hardy herbaceous and alpine.

Messrs. G. Jackman & Son, Woking, for Roses.

Messrs. J. Peed & Son, West Norwood, for Caladiums, Gloxinias, &c.

Mr. Amos Perry, Winchmore Hill, N., for hardy flowers, Water Lilies, &c.

Mr. L. R. Russell, Richmond, S.W., for hardy ornamental trees and shrubs, tree Iviess, stove and greenhouse foliage plants.

Silver-gilt Flora Medal.

Messrs. Barr & Sons, 12 King Street, W.C., for herbaceous flowers and pigmy trees.

Messrs. W. Bull & Son, Chelsea, S.W., for foliage and flowering plants.

Messrs. J. Cheal & Sons, Crawley, for ornamental trees and shrubs.

Mr. C. W. Breadmore, Winchester, for Sweet Peas and hardy flowers.

Messrs. Dobbie & Co., Rothesay, for Pansies, Violas, Sweet Peas, &c.

Mr. G. Reuthe, Keston, for rare shrubs, hardy flowers, &c.

Messrs. H. Low & Co., Enfield, N., for Orchids and miscellaneous plants.

Mr. John Forbes, Hawick, N.B., for Phloxes, Pentstemons, and Delphiniums.

Messrs. H. Cannell & Sons, Swanley, for Cannas &c.

Silver-gilt Banksian Medal.

Mr. A. F. Dutton, Iver, Bucks, for Carnations.

Messrs. R. H. Bath, Ltd., Wisbech, for Roses and Carnations.

Messrs. W. Fromow and Sons, Chiswick, for Bamboos and Japanese Maples.

Messrs. A. Dickson & Son, Newtownards, for Roses.

Mr. W. Iceton, Putney, S.W., for foliage plants and Lilies of the Valley.

Messrs. Kelway & Son, Langport, for hardy plants and Delphiniums.

The King's Acre Nurseries, Hereford, for Roses and hardy flowers.

Messrs. G. & A. Clark, Dover, for Sweet Peas and hardy plants.

Messrs. Hobbies, Ltd., Dereham, for Roses.

Messrs. G. Cooling & Sons, Bath, for Roses.

Messrs. J. Laing & Sons, Forest Hill, S.E., for Caladiums, Begonias, &c.

Manifattura di Signa, 17 Mount Street, W., for terra-cotta vases and garden ornaments.

Silver Flora Medal.

Mary Countess of Ilchester, Holland House, W., for semi-tropical plants.

Lady Phillimore, Campden Hill, W., for Fuchsias.

E. E. Grimson, Esq., Sutton, for Roses.

J. A. Young, Esq., Putney, S.W. (gr. G. H. Street), for Carnations.

Messrs. Jarman & Co., Chard, for Centaureas, Carnations, &c.

Messrs. B. Ladhams, Ltd., Shirley, Hants, for cut flowers.

Mr. J. Douglas, Great Bookham, for Carnations.

Mr. H. Eckford, Wem, for Sweet Peas.

Mr. C. F. Waters, Balcombe, for Carnations.

Mr. W. J. Godfrey, Exmouth, for Pelargoniums and *Solanum Wendlandii*.

Mr. A. Ll. Gwillim, New Eltham, for Begonias.

Mr. R. C. Notcutt, Woodbridge, for hardy plants.

Mr. D. Russell, Brentwood, for hardy plants, trees, &c.

Messrs. G. Stark & Son, Great Ryburgh, for Sweet Peas.

Messrs. W. Artindale & Son, Nether Green, for hardy flowers.

Silver Knightian Medal.

Lord Hillingdon, Uxbridge (gr. A. R. Allan), for Strawberries.

Messrs. W. Ray & Co., Teynham, for a collection of Cherries.

Mr. D. G. Cornwell, Worthing, for postal flower boxes, fruit packing baskets and cases.

Mr. G. W. Riley, Herne Hill, S.E., for rustic summer-houses.

Messrs. A. Shanks & Son, Bush Lane House, E.C., for lawn-mowers.

Messrs. W. Duncan Tucker & Sons, South Tottenham, for green-houses.

Messrs. Merryweather & Sons, Greenwich Road, S.E., for watering appliances, hose, pumps, &c.

Silver Banksian Medal.

E. Mocatta, Esq., Addlestone (gr. T. Stevenson), for Sweet Peas.

C. C. Paine, Esq., Haverstock Hill, N.W. (gr. H. Whiting), for Grapes.

Swanley Horticultural College, for fruit.

Messrs. J. K. King & Sons, Coggeshall, for Sweet Peas.

Mr. E. Poupart, Twickenham, for Sweet Peas.

Mr. H. C. Pulham, Elsenham, for alpine and rock plants.

The Misses Hopkins, Knutsford, for alpines.

Messrs. Heath & Son, Cheltenham, for Carnations, foliage, and flowering plants.

Messrs. W. & J. Brown, Stamford, for Roses, flowering plants, &c.

Mr. A. J. Upton, Guildford Hardy Plant Nursery, for hardy plants.

Mr. Vincent Slade, Taunton, for Zonal Pelargoniums.

Mr. Philip Castle, Baltic Wharf, Millbank, for teak tables and garden seats.

The Potters' Arts Guild, Compton, Guildford, for terra-cotta garden furniture.

Messrs. Pulham & Son, 71 Newman Street, W., for "Pulhamite Stone" vases &c.

Messrs. Ransomes, Sims, & Jefferies, Ipswich, for lawn-mowers.

Messrs. T. Green & Son, Southwark Street, S.E., for lawn-mowers.

Messrs. W. Wood & Son, Wood Green, N., for garden sundries.

Messrs. Headley & Edwards, Cambridge, for garden furniture.

Bronze Banksian Medal.

Mr. James George, Putney, S.W., for garden sundries.

Messrs. Liberty & Co., Regent Street, W., for terra-cotta garden pottery, sun-dials, &c.

Messrs. Abbott Bros., Southall, W., for table trays and preserving bottles.

Messrs. J. Bentley, Ltd., Barrow-on-Humber, for horticultural sundries.

Messrs. D. Dowel & Son, Hammersmith, W., for orchid pottery and sundries.

Messrs. W. Herbert & Co., 2 Hop Exchange, S.E., for horticultural sundries.

Messrs. Champion & Co., 115 City Road, E.C., for tubs for shrubs.

Mr. J. Pinches, Camberwell, S.E., for Acme labels.

GENERAL MEETING.

JULY 17, 1906.

Mr. C. H. CURTIS in the Chair.

Fellows elected (58).—Charles Alcock, Leo Allen, Mrs. Allen, Countess of Amherst, Hugh K. Anderson, M.D., W. Arkwright, Miss Beit, Arnold du T. Bottomley, H. L. Brooksbank, Sir Henry Bulwer, G.C.M.G., Miss Burnaby, G. G. Capon, W. Cater, P. G. Collins, Mrs. Cooper, Dr. V. Le Corbould, Rev. Prebendary Covington, Miss H. M. Crawley, A. C. Davidson, Norman Dawson, I. W. Dearden, Charles Dowson, E. Dowson, Mrs. W. Dymock, Miss Fanny Evans, R. Farrance, Miss F. A. Fowler, J. W. C. Frere, Hon. Rupert Guinness, C.M.G., Lady Gwendolen Guinness, Miss C. T. Haslewood, Mrs. Hewitt, C. H. Heygate, Hilary W. Jacomb, W. A. Luning, J. W. Marsh, A. M. S. Methuen, Mrs. A. M. S. Methuen, Harry Miles, A. Michelson, E. M. Moss, Mrs. F. Newbott, John Platt, G. Riley, Harry Robins, Lady Rücker, Mrs. E. Schluter, Mrs. E. Shaw, Mrs. Sicklemore, Mrs. A. Smith, G. Sneath, Mrs. G. Sneath, A. T. Squarey, Mrs. Tapp, Mrs. Timson, H. J. Treadwell, W. B. Walter, Miss Sophia White.

Fellows resident abroad (1).—Mrs. E. T. Plant (N. Queensland).

Society affiliated (1).—Aberdare Horticultural Society.

A lecture on "Sweet Peas" was given by Mr. H. J. Wright.

GENERAL MEETING.

JULY 31, 1906.

Sir TREVOR LAWRENCE, Bart., K.C.V.O. (President of the Society), in the Chair.

Fellows elected (25).—Hon. Wm. Brooks, Mrs. G. N. Butler, H. Mansfield Cobb, Prince Alexis Dolgorouki, Harvey R. Drew, George Favorke, Edward Goulding, Cecil H. Gregory, Mrs. E. M. Hall, Mrs. P. Henriques,

C. J. Hinsley, Miss L. M. C. Jacob, Mrs. Jefferies, Mrs. A. J. G. Nicholson, Miss Paget, C. Pelham-Clinton, A. H. Perkins, W. Porter, C. H. Sanctuary, L. Shoobridge, J.P., Herbert Smith, W. Byron Stilwell, Mrs. J. A. Symonds, Her Grace the Duchess of Wellington, R. Woodward.

Fellows resident abroad (3).—L. Houry (France), G. A. Knight (British Columbia), Gustav von Dippe (Germany).

Society affiliated (1).—Stratford Horticultural and General Produce Society (New Zealand).

The Sessions of the International Congress on Plant-Breeding were held on July 31, August 1 and 2, and the Report of this Congress has been issued as a separate volume, with the following title:—

“Report of the Third International Conference, 1906, on Genetics; Hybridisation (the Cross-Breeding of Genera or Species), the Cross-Breeding of Varieties, and General Plant-Breeding.” Edited by the Rev. W. Wilks, M.A., Secretary.

GENERAL MEETING.

AUGUST 14, 1906.

Major G. L. HOLFORD, C.I.E., C.V.O., in the Chair.

Fellows elected (19).—A. P. Adam, J. H. Bentley, Lady Monica Bullough, H. P. Cannell, J. Sydney Davey, Dr. W. S. Darby, J. H. English, R. S. Gleave, Edward Graham, W. R. Haywood, Maurice Hewlett, Rev. T. Austen Holcroft, W. W. Kettlewell, J.P., Mrs. W. Oser, G. H. Pethybridge, Hon. Mrs. J. Talbot Rice, Dr. Salaman, Rev. J. C. Titcombe, Sydney Unwin, B.Sc.

Fellows resident abroad (2).—P. J. Hannon (South Africa), Prof. N. E. Hansen (U.S.A.).

Associate (1).—Ramyad Lall (India).

GENERAL MEETING.

AUGUST 28, 1906.

Mr. JOSEPH CHEAL in the Chair.

Fellows elected (12).—Mrs. A. Bingham, Mrs. Cosmo Bonsor, Mrs. O. W. Brinton, Henry T. Cadbury, W. C. Christy, B. Dellagana, Thomas H. Dipnall, W. H. Fowler, Mrs. Ellis Holland, W. Jackson, J.P., Alwyn Parker, H. Prime.

Fellows resident abroad (3).—George Duthie (South Africa), William Park (New Zealand), F. J. Stevens (Transvaal).

Society affiliated (1).—Matlock Cottage Garden Association.

A lecture on “Meteorology in its Relation to Horticulture,” illustrated by lantern slides, was given by Mr. R. H. Curtis, F.R.Met.Soc. (see p. 104).

GENERAL MEETING.

SEPTEMBER 11, 1906.

Mr. WILLIAM CUTHBERTSON in the Chair.

Fellows elected (8).—J. Beverley, J. Brown, F. E. Charles, Mrs. C. E. Goodhart, Hon. Mrs. Heywood-Lonsdale, E. C. Reading, J. Russell, Miss Jeanie Watson.

Fellows resident abroad (2).—D. E. Dowsett (South Africa), T. Tsujimura (Japan).

Associate (1).—Harry Lock.

A lecture on the "Education of the Cottage Gardener," illustrated by lantern slides, was given by Mr. T. S. Dymond (see p. 113).

GENERAL MEETING.

SEPTEMBER 25, 1906.

Mr. A. NORMAN FLACK in the Chair.

Fellows elected (11).—Mrs. W. A. Colls, B. Walmsley Cotham, Mrs. F. Vaughan Elliott, Mrs. Featherstonhaugh, Miss M. E. Gorringe, Lady Constance Hanson, T. G. Litchfield, Mrs. Otter, Mrs. J. Shirreff, Lady Trayner, Capt. Walter.

Societies affiliated (2).—Sandhurst, Yately and District Gardeners' Mutual Improvement Society; Wellington and District Horticultural and Cottage Garden Society.

A lecture on the "Distillation of Perfumes from Flowers," illustrated by lantern slides, was given by Mr. John C. Umney (see p. 123).

GENERAL MEETING.

OCTOBER 9, 1906.

Mr. G. S. SAUNDERS, F.L.S., F.E.S., in the Chair.

Fellows elected (42).—Sir Andrew Agnew, Bart., Miss E. M. Baker, E. O. Barry, W. T. Birts, A. G. Bishop, Mrs. S. Blount, C. E. B. Bowles, Mrs. J. J. Brown, Hon. Col. H. Burton, J. O. Cheadle, Miss Chitty, A. H. Seddon Cripps, Mrs. Penn Curzon, Baron de Steiger, Mrs. Durlacher, C. Eldred, Mrs. Falconer, A. P. Ford, R. Harding, T. D. Hewitt, A. W. Isaac, D. L. Johnson, Mrs. T. N. Lengman, W. Mansell, J. Penn Milton, W. H. Pibel, W. H. Press, Lady Puleston, W. G. Raphael, Miss Rawlings, Capt. H. P. Salmon, F. G. Sargood, G. E. Sery, Mrs. R. B. Shaw, Hon. Mrs. Abel H. Smith, Mrs. Spensley, W. Thompson, John Thornton, Miss Thursby-Pelham, A. H. E. Wood, Mrs. E. Woods, Mrs. R. L. Yates.

Fellows resident abroad (3).—F. Wright (U.S.A.), A. Green (Australia), Miss J. A. Stuckey (S. Australia).

Associate (1).—Miss B. Schryver.

Societies affiliated (2).—Burnham-on-Crouch Gardeners' Association ; Chelmsford and District Gardeners' Association.

A lecture on the "Origin and Peculiarities of Climbing Plants," illustrated by lantern slides, was given by the Rev. Prof. G. Henslow, V.M.H. (see p. 141).

THIRTEENTH ANNUAL EXHIBITION OF BRITISH-GROWN FRUIT.

HELD AT THE SOCIETY'S HALL, VINCENT SQUARE, S.W.,
OCTOBER 16, and 17, 1906.

LIST OF SUBSCRIBERS TO THE PRIZE FUND OF 1906.

	£	s.	d.
Bythway, Wm., Llanelly, S. Wales	1	1	0
Challis, T., Wilton Gardens, Salisbury	0	5	0
Lee, John, Babington, Cheshire	0	10	6
McLaren, Mrs., 56 Ashley Gardens, S.W.	1	1	0
Planck, Surg.-General	1	1	0
Ross, Chas., Welford Park, Newbury	0	10	6
Spooner, S., & Son, Hounslow	1	1	0
Wallace, L. A., Sanderstead Court, Croydon	5	0	0

THE JUDGES.

The following gentlemen kindly acted as Judges, and deserve the best thanks of the Society for their oftentimes very difficult work, viz.—

Allan, W., Gunton Park Gardens, Norwich.
 Arnold, T., Cirencester Park Gardens, Gloucester.
 Bacon, W. H., Mote Park Gardens, Maidstone.
 Barnes, N. F., Eaton Gardens, Chester.
 Barnes, W., Bearwood Gardens, Wokingham.
 Basham, J., Bassaleg, Newport, Mon.
 Bates, W., Cross Deep Gardens, Twickenham.
 Beckett, E., Aldenham House Gardens, Elstree.
 Blick, C., Warren House Gardens, Hayes, Kent.
 Bowerman, J., Hackwood Park Gardens, Basingstoke.
 Challis, T., V.M.H., Wilton House Gardens, Salisbury.
 Cheal, J., Crawley, Sussex.
 Coomber, T., The Hendre Gardens, Monmouth.
 Cornford, J., Quex Park Gardens, Birchington.
 Crump, W., V.M.H., Madresfield Court Gardens, Malvern.
 Dean, Alex., V.M.H., 62 Richmond Road, Kingston.
 Divers, W. H., Belvoir Castle Gardens, Grantham.
 Doe, J.,
 Douglas, J., V.M.H., Great Bookham, Surrey.
 Earp, W., Bayham Abbey Gardens, Lamberhurst.
 Fielder, C. R., North Mymms Park Gardens, near Hatfield.
 Foster, C., University College, Reading.
 Fyfe, W., Lockinge Park Gardens, Wantage.
 Gibson, J., Welbeck Abbey Gardens, Worksop.
 Goodacre, J. H., Elvaston Castle Gardens, Derby.

Jaques, J., Bryanston Gardens, Blandford.
 Kelf, G., South Villa Gardens, Regent's Park, N.W.
 Lyne, J., Foxbury Gardens, Chislehurst.
 McIndoe, J., V.M.H., 8 Hythe Street, Dartford.
 Markham, H., Wrotham Park Gardens, High Barnet.
 Molyneaux, E., V.M.H., Swanmore Gardens, Bishop's Waltham.
 Mortimer, S., Rowledge, Farnham, Surrey.
 Parr, H., Trent Park Gardens, New Barnet.
 Paul, G., J.P., V.M.H., Cheshunt, Herts.
 Pearson, A. H., The Hut, Lowdham, Nottingham.
 Pearson, C. E., Chilwell Nurseries, Lowdham, Nottingham.
 Poupart, W., Marsh Farm, Twickenham.
 Reynolds, G., Gunnersbury Park Gardens, Acton, W.
 Rivers, H. Somers, Sawbridgeworth.
 Ross, C., Welford Park Gardens, Newbury.
 Salter, C. J., Woodhatch Gardens, Reigate.
 Taylor, W., Tewkesbury Lodge Gardens, Forest Hill, S.E.
 Veitch, P. C. M., J.P., New North Road, Exeter.
 Vert, J., Audley End Gardens, Saffron Walden.
 Walker, J., The Farm, Ham Common, Surrey.
 Ward, A., Godinton Gardens, Ashford.
 Willard, Jesse, Holly Lodge Gardens, Highgate.
 Woodward, G., Barham Court Gardens, Teston.

THE REFEREES.

The following gentlemen very kindly held themselves at the disposal of the Society to act in conjunction with any of the Judges as Referees if required, viz.—

Bunyard, G., V.M.H., Royal Nurseries, Maidstone.
 Hudson, J., V.M.H., Gunnersbury House Gardens, Acton, W.
 Thomas, Owen, V.M.H., 25 Waldeck Road, West Ealing.

OFFICIAL PRIZE LIST.

(The address and the Gardener's name are entered on the first occurrence, but afterwards only the Owner's name is recorded.)

DIVISION I.

Fruits grown under Glass or otherwise.

Open to Gardeners and Amateurs only.

NOTE.—Exhibitors can compete in one Class only of Classes 1, 2 and of Classes 3, 4.

Class 1.—Collection of 9 dishes of Ripe Dessert Fruit:—6 kinds at least; only 1 Pine, 1 Melon, 1 Black and 1 White Grape allowed; not more than two varieties of any other kind, and no two dishes of the same variety.

First Prize, Silver Cup and £5; Second, £5; Third, £3.

1. The Earl of Harrington, Derby (gr. J. H. Goodacre).
2. Hon. Mr. Justice Swinfen Eady, Weybridge (gr. J. Lock)
3. No award.

Class 2.—Collection of 6 dishes of Ripe Dessert Fruit:—4 kinds at least; only 1 Melon, 1 Black and 1 White Grape allowed; not more than two varieties of any other kind, and no two dishes of the same variety. Pines excluded.

First Prize, Silver Cup and £3; Second, £3; Third, £2.

1. The Earl of Londesborough, Market Weighton (gr. J. C. McPherson).
2. J. W. Fleming, Esq., Romsey (gr. W. Mitchell).
3. W. Cooper, Esq., Towcester (gr. G. J. Squibbs).

Class 3.—Grapes, 6 distinct varieties, 2 bunches of each; both Black and White must be represented.

First Prize, Silver Cup and £3; Second, £3.

1. J. W. Fleming, Esq.
2. No award.

Class 4.—Grapes, 4 varieties, selected from the following: 'Madresfield Court,' 'Mrs. Pince,' 'Muscat Hamburg,' 'Muscat of Alexandria' or 'Canon Hall' (not both), 'Mrs. Pearson,' and 'Dr. Hogg,' 2 bunches of each.

First Prize, Silver Cup and £3; Second, £3; Third, £2.

1. C. Bayer, Esq., Forest Hill (gr. W. Taylor).
2. } No award.
3. }

Class 5.—Grapes, Black Hamburg, 2 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. J. W. Fleming, Esq.
2. The Earl of Harrington.
3. No award.

Class 6.—Grapes, 'Mrs. Pince,' 2 bunches.

First Prize, £1. 10s.; Second, £1.

1. J. W. Fleming, Esq.
2. Col. G. B. Archer-Houblon, Bishop's Stortford (gr. W. Harrison).

Class 7.—Grapes, Alicante, 2 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. W. G. Raphael, Esq., Englefield Green (gr. H. H. Brown).
2. The Earl of Stanhope, Sevenoaks (gr. C. Sutton).
3. C. Bayer, Esq.

Class 8.—Grapes, 'Madresfield Court,' 2 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. J. W. Fleming, Esq.
2. C. Bayer, Esq.
3. The Earl of Harrington.

Class 9.—Grapes, any other Black Grape, 2 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. The Earl of Londesborough.
2. Studley, Horticultural College (Miss Faithfull).
3. The Earl of Stanhope.

Class 10.—Grapes, 'Muscat of Alexandria,' 2 bunches.

First Prize, £2; Second, £1. 5s.; Third, 15s.

1. The Earl of Harrington.
2. H. J. King, Esq., Ashford, Kent (gr. G. Weston).
3. Major Hibbert, Rugby (gr. W. Camm).

Class 11.—Grapes, any other White Grape, 2 bunches.

First Prize, £1. 10s.; Second, £1; Third, 10s.

1. Hon. Mr. Justice Swinfen Eady.
2. A. Benson, Esq., Merstham (gr. W. Mancey).
3. W. Maynard, Esq., Ledbury (gr. W. E. Hyde).

Class 12.—Grapes, 2 bunches of any Frontignan varieties.

First Prize, £1. 10s.; Second, £1.

No entry.

Class 13.—Collection of Hardy Fruits, in a space not exceeding 12 × 3:—30 dishes distinct, grown entirely in the open; not more than 12 varieties of Apples or 8 of Pears.

First Prize, The Hogg Medal and £3; Second, £2; Third, £1.

1. Sir Marcus Samuel, Bart., Maidstone (gr. W. H. Bacon).
2. Major Powell-Cotton, Birchington.
3. Mr. A. B. Wadds, Crawley.

DIVISION II.

Open to Nurserymen only.

Conditions for Classes 14, 15, 16, 17, 18, and 19.

Nurserymen and Market Growers must exhibit as individuals or as firms. *They must have actually grown all they exhibit.* Combinations of individuals or firms are not allowed, nor collections of produce from districts.

Nurserymen and Market Growers desiring to exhibit at this Show must make application for space as under Class 14 or 15; 16; 17 or 18; 19. No other spaces but the above can be allotted. Exhibitors can only enter in one of Classes 14 and 15; or in one of 17 and 18; and Exhibitors in 17 and 18 may not show in Class 19.

Nurserymen and Market Growers may adopt any method of staging they desire, subject to the following reservations: (a) The number of fruits is not limited, but the baskets or dishes must not exceed 15 inches in diameter if circular, or 19 × 15 if rectangular, unless they be sieves or half-sieves; (b) Duplicate trees are permitted in Class 16, but *not duplicate baskets or dishes* of fruit in any of the Classes; (c) No trees are admissible in Classes 14 and 15; (d) The fruit in Exhibits under Classes 14 and 15, 17 and 18, must in no case be raised higher than 2 feet above the table, but the use of foliage plants is allowed.

No awards of any sort will be made to Nurserymen and Market Growers who do not conform to the above regulations.

IMPORTANT.—Nurserymen and Market Growers having entered and finding themselves unable to exhibit are *particularly* requested to give four days' notice to the Superintendent, R.H.S. Gardens, Wisley, Ripley, Surrey. Telegraphic Address—"Hortensia, Ripley."

Allotment of table-space will be made on the following scales:—

For Fruit grown entirely out of doors.

Class 14.—24 feet run of 6 feet tabling.

First Prize, Gold Medal; Second, Silver-gilt Knightian Medal;

Third, Silver-gilt Banksian Medal.

1. Messrs. G. Bunyard & Co., Maidstone.
2. Messrs. H. Cannell & Sons, Eynsford.
3. Messrs. J. Cheal & Sons, Crawley.

Class 15.—16 feet run of 6 feet tabling.

First Prize, Silver-gilt Knightian Medal; Second, Silver-gilt Banksian Medal.

1. { King's Acre Nurseries, Limited, Hereford. } equal.
 { Mr. J. Basham, Newport, Mon. }
2. Messrs. Paul & Son, Cheshunt.

For Orchard-house Fruit and Trees.

Class 16.—24 feet by 6 feet of stage.

First Prize, Gold Medal.

1. { Messrs. G. Bunyard & Co. } equal.
 { Messrs. Rivers & Son, Sawbridgeworth. }

DIVISION III.

Open to Market Growers only.

Allotment of Table Space will be made on the following scales:—

Class 17.—18 feet run of 6 feet tabling.

First Prize, £2; Second, £1. 10s.; Third, £1.

No entry.

Class 18.—12 feet run of 6 feet tabling.

First Prize, £2; Second, £1. 10s.; Third, £1.

1. Mr. G. H. Dean, Sittingbourne.
2. Mr. W. Poupart, Twickenham.
3. Mr. W. H. Press, Hereford.

Class 19.—Apples, 12 dishes distinct, 6 Cooking, 6 Dessert; Exhibitors in Classes 17 and 18 not admissible.

First Prize, £2; Second, £1. 10s.; Third, £1.

1. Miss R. M. Courtauld, Earl's Colne.
2. } No awards.
3. }

DIVISION IV.

Fruits grown entirely in the Open Air—except Class 32.

Open to Gardeners and Amateurs only. Nurserymen and Market Growers excluded.

Exhibitors of Apples or Pears in Division IV. are excluded from Division VI.

NOTE.—Exhibitors can compete in one Class only of the Classes 20, 21, 22; or 25, 26, 27, 28.

Class 20.—Apples, 24 dishes distinct, 16 Cooking, 8 Dessert. The latter to be placed in the front row.

First Prize, £4; Second, £3; Third, £2.

1. Lieut.-Col. Borton, Hunton (gr. J. Writtle).
2. R. H. B. Marsham, Esq., Maidstone (gr. W. Lewis).
3. H. Whiteley, Esq., Torquay.

Class 21.—Apples, 18 dishes distinct, 12 Cooking, 6 Dessert. The latter to be placed in the front row.

First Prize, £3 ; Second, £2 ; Third, £1.

1. J. G. Williams, Esq., Tring (gr. F. G. Gerrish).
2. Sir Marcus Samuel.
3. O. E. d'Avigdor-Goldsmid, Tonbridge (gr. C. Earl).

Class 22.—Apples, 12 dishes distinct, 8 Cooking, 4 Dessert. The latter to be placed in the front row.

First Prize, £2 ; Second, £1 ; Third, 15s.

1. C. R. Adeane, Esq., Babraham (gr. R. Alderman).
2. Rt. Hon. W. H. Long, Trowbridge (gr. W. Strugnell).
3. Brodie Henderson, Esq., Hertford (gr. H. Garland).

Class 23.—Cooking Apples, 6 dishes, distinct.

First Prize, £1 ; Second, 15s. ; Third, 10s.

1. Lieut.-Col. Borton.
2. Hon. J. Boscawen, Perranwell.
3. Mr. A. Basile, Weybridge.

Class 24.—Dessert Apples, 6 dishes, distinct.

First Prize, £1 ; Second, 15s. ; Third, 10s.

1. Lieut.-Col. Borton.
2. Sir Marcus Samuel.
3. C. O. Walter, Esq., Wantage.

Class 25.—Dessert Pears, 18 dishes, distinct.

First Prize, £3. 10s. ; Second, £2 ; Third, £1.

1. Sir Marcus Samuel.
2. Sir E. G. Loder, Bart., Horsham (gr. W. A. Cook).
3. Major Powell-Cotton.

Class 26.—Dessert Pears, 12 dishes, distinct.

First Prize, £2 ; Second, £1 ; Third, 15s.

1. Rt. Hon. W. H. Long.
2. Mr. A. Basile.
3. Lieut.-Col. Borton.

Class 27.—Dessert Pears, 9 dishes, distinct.

First Prize, £1. 10s. ; Second, 17s. 6d.

1. F. A. Bevan, Esq., New Barnet (gr. H. Parr).
2. No award.

Class 28.—Dessert Pears, 6 dishes, distinct.

First Prize, £1 ; Second, 15s. ; Third, 10s.

1. A. Benson, Esq.
2. F. E. Croft, Esq., Ware (gr. G. Longhurst).
3. E. Phillips, Esq., Sittingbourne.

Class 29.—Stewing Pears, 3 dishes, distinct.

First Prize, 15s. ; Second, 10s. ; Third, 5s.

1. Sir Marcus Samuel.
2. Major Powell-Cotton.
3. E. Phillips, Esq.

Class 30.—Peaches grown entirely out of doors, 1 dish of one variety.
First Prize, 10s. ; Second, 7s.

1. C. R. Adeane, Esq.
2. Mr. A. R. Allan, Uxbridge.

Class 31.—Nectarines grown entirely out of doors, 1 dish of one variety.

First Prize, 10s. ; Second, 7s.

1. Hon. Mr. Justice Swinfen Eady.
2. C. R. Adeane, Esq.

Class 32.—Plums grown under Glass, 3 dishes, distinct.
First Prize, £1 ; Second, 10s.

1. The Earl of Harrington.
2. No award.

Class 33.—Plums, 3 dishes of Plums, distinct.
First Prize, 15s. ; Second, 10s.

1. Major Hibbert.
2. J. B. Fortescue, Esq., Maidenhead (gr. C. Page).

Class 34.—Plums, 1 dish of Coe's Golden Drop.
First Prize, 7s. ; Second, 5s.

1. J. B. Fortescue, Esq.
2. C. H. Berners, Esq., Ipswich (gr. W. Messenger).

Class 35.—Plums, 1 dish of any other Dessert variety.
First Prize, 7s. ; Second, 5s.

1. C. H. Berners, Esq.
2. The Earl of Pembroke, Salisbury (gr. T. Challis).

Class 36. Plums, 1 dish of Cooking of one variety.
First Prize, 7s. ; Second, 5s.

1. Mr. J. Vert, Saffron Walden.
2. Major Hibbert.

Class 37.—Damsons, or Bullaces, 3 dishes, distinct.
First Prize, 10s. ; Second, 7s. 6d.

No exhibit.

Class 38.—Morello Cherries, 50 fruits.
First Prize, 7s. ; Second, 5s.

1. J. G. Williams, Esq.
2. Right Hon. W. H. Long.

Class 39.—Grapes grown out of doors, Basket of about 6lb. weight.
First Prize, £1 ; Second, 10s.

1. E. Ascherson, Esq., Charing (gr. J. Pitts).
2. M. Devenish, Esq., Addington.

DIVISION V.

Special District County Prizes.

Open to Gardeners and Amateurs only.

(In this Division all Fruit must have been grown in the Open.)

N.B.—Exhibitors in Division V. must not compete in Divisions II. or III., or in Classes 1, 2, 3, 4, 13, 20, 21, 22, 25, 26, 27.

Class **AA**.—Apples, 6 dishes, distinct, 4 Cooking, 2 Dessert.

1st Prize, £1 and 3rd class Single Fare from Exhibitor's nearest railway station to London *; 2nd Prize, 15s. and Railway Fare as above.*

Class **BB**.—Dessert Pears, 6 dishes, distinct.

1st Prize, £1. 10s. and Railway Fare as above *; 2nd Prize, £1 and Railway Fare as above.*

The two above classes, Nos. AA and BB, are repeated eleven times as follows, and Exhibitors must enter for them thus: "Class AA 41" or "BB 42," and so on, to make it quite clear whether they mean Apples or Pears.

* In the event of the same Exhibitor being successful in both classes AA and BB only one Railway Fare will be paid; and no Railway Fare will be paid if the fruit is sent up for the Society's officers to unpack and stage.

Class **40**.—Open only to Kent Growers.

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|-----|---|---|
| AA. | { | 1. E. Chopping, Esq., Sittingbourne. |
| | { | 2. H. G. Kleinwort, Esq., Maidstone (gr. B. J. Mercer). |
| BB. | { | 1. C. G. B. Marsham, Esq., Sevenoaks (gr. R. Edwards). |
| | { | 2. E. Phillips, Esq. |

Class **41**.—Open only to Growers in Surrey, Sussex, Hants, Dorset, Somerset, Devon, and Cornwall.

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|-----|---|---|
| AA. | { | 1. B. H. Hill, Esq., Crediton (gr. G. Lock). |
| | { | 2. F. J. B. Wingfield-Digby, Esq., Sherborne (gr. T. Turton). |
| BB. | { | 1. F. J. B. Wingfield-Digby, Esq. |
| | { | 2. B. H. Hill, Esq. |

Class **42**.—Open only to Growers in Wilts, Gloucester, Oxford, Bucks, Berks, Beds, Herts, and Middlesex.

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|-----|---|--------------------------|
| AA. | { | 1. Mr. A. R. Allan. |
| | { | 2. J. B. Fortescue, Esq. |
| BB. | { | 1. J. B. Fortescue, Esq. |
| | { | 2. Mr. A. R. Allan. |

Class **43**.—Open only to Growers in Essex, Suffolk, Norfolk, Cambridge, Hunts, and Rutland.

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|-----|---|--|
| AA. | { | 1. Hon. W. Lowtber, Wickham Market (gr. A. Andrews). |
| | { | 2. Major Petre, Norwich (gr. G. D. Davidson). |
| BB. | { | 1. Major Petre. |
| | { | 2. C. H. Berners, Esq. |

Class **44**.—Open only to Growers in Lincoln, Northampton, Warwick, Leicester, Notts, Derby, Staffs, Shropshire, and Cheshire.

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|-----|---|--|
| AA. | { | 1. John Lee, Esq., Higher Bebington. |
| | { | 2. Major Hibbert. |
| BB. | { | 1. F. Bibby, Esq., Shrewsbury (gr. J. Taylor). |
| | { | 2. Mr. J. Gibson, Worksop. |

Class 45.—Open only to Growers in Worcester, Hereford, Monmouth, Glamorgan, Carmarthen, and Pembroke.

- AA. { 1. R. M. Whiting, Esq., Hereford.
2. F. P. Norbury, Esq., Malvern.
BB. { 1. G. H. Hadfield, Esq., Ross (gr. J. Rick).
2. W. Maynard, Esq.

Class 46.—Open only to Growers in the other Counties of Wales.

- AA. { 1. Sir George Meyrick, Bart., Anglesey (gr. J. P. Pilgrim).
2. Col. Cornwallis-West, Ruthin (gr. H. Forder).
BB. { 1. Sir George Meyrick.
2. Col. Cornwallis-West.

Class 47.—Open only to Growers in the Six Northern Counties of England, and in the Isle of Man.

- AA. { 1. J. Brennand, Esq., Thirsk (gr. J. E. Hathaway).
2. The Earl of Lathom, Ormskirk (gr. B. Ashton).
BB. { 1. J. Brennand, Esq.
2. The Earl of Lathom.

Class 48.—Open only to Growers in Scotland.

- AA. { 1. Mr. J. Duff, Castle Douglas.
2. The Duke of Richmond and Gordon, Fochabers.
BB. { 1. Mr. J. Day, Garlieston.
2. No award.

Class 49.—Open only to Growers in Ireland.

- AA. { 1. C. B. Broad, Esq., Conna.
2. W. McM. Kavanagh, Esq., J.P., D.L. Carlow (gr. F. Brown).
BB. { 1. W. McM. Kavanagh, Esq.
2. No award.

Class 50.—Open only to Growers in the Channel Islands.
No entry.

DIVISION VI.

Single Dishes of Fruit grown in the Open Air.

Six Fruits to a Dish.

Open to Gardeners and Amateurs only, except Class 59.

Nurserymen and Market Growers excluded.

Prizes in each Class except 59, 69, 87, 88, 96, 120. 1st Prize, 7s.;
2nd Prize, 5s.

CHOICE DESSERT APPLES.

N.B.—Quality, Colour, and Finish are of more merit than Size.

Class 51.—Adams' Pearmain.

1. B. H. Hill, Esq.
2. The Earl of Devon, Exeter (gr. T. H. Bolton).

Class 52.—Allington Pippin.

1. Major Petre.
2. Hon. J. Boscawen.

Class 53.—American Mother.

1. F. J. B. Wingfield-Digby, Esq.
2. Hon. Mr. Justice Swinfen Eady.

Class 54.—Blenheim Orange. (See Class 74.)

Small highly coloured fruits which will pass through a 3-inch ring.

1. H. G. Kleinwort, Esq.
2. C. H. Berners, Esq.

Class 55.—Claygate Pearmain.

1. G. H. Hadfield, Esq.
2. H. G. Kleinwort, Esq.

Class 56.—Cox's Orange Pippin.

1. Jeremiah Colman, Esq., Reigate (gr. W. Bound).
2. W. W. Kettlewell, Bristol.

Class 57.—Duke of Devonshire.

1. Hon. J. Boscawen.
2. W. W. Kettlewell, Esq.

Class 58.—Egremont Russet.

1. J. Lee, Esq.
2. C. P. Wykeham-Martin, Esq., Maidstone (gr. D. McAinsh).

Class 59.—Houblon.

First Prize, £5 ; Second, £3 ; Third, £2.

Prizes presented by Messrs. Horne, of Cliffe, Rochester.

Open also to Nurserymen.

1. Mr. G. H. Dean.
2. Mr. G. Pyne, Topsham.
3. No award.

Class 60.—James Grieve.

1. R. M. Whiting, Esq.
2. F. Lansdell, Esq., Desford.

Class 61.—King of the Pippins.

1. Jeremiah Colman, Esq.
2. B. H. Hill, Esq.

Class 62.—King of Tomkins County.

1. J. Brennand, Esq.
2. Col. G. B. Archer-Houblon (gr. W. Harrison).

Class 63.—Lord Hindlip.

1. E. W. Caddick, Esq., Ross.
2. Owen G. S. Croft, Esq., Hereford.

Class 64.—Margil.

1. Mr. A. R. Allan.
2. G. J. Gribble, Esq., Biggleswade (gr. A. Carlisle).

Class 65.—Ribston Pippin.

1. Mrs. St. V. Ames, Westbury-on-Trym (gr. W. H. Bannister).
2. Mr. A. R. Allan.

Class 66.—Ross Nonpareil.

1. B. H. Hill, Esq.
2. C. P. Wykeham-Martin, Esq.

Class 67.—Scarlet Nonpareil.

1. Dowager Lady Hillingdon, Sevenoaks (gr. J. Shelton).
2. Col. G. B. Archer-Houblon, Newbury (gr. C. Ross).

Class 68.—St. Edmund's Pippin.

No award.

Class 69.—Any other variety not named above.

Four Prizes : 7s., 6s., 5s., 4s.

An Exhibitor may only enter one variety in Class 69, in which Class eight Fruits must be shown to a dish for the Judges to be able to taste two of them.

1. Col. G. B. Archer-Houblon (gr. C. Ross).
2. R. M. Whiting, Esq.
3. H. H. Williams, Esq., Pencalenick.
4. B. H. Hill, Esq.

CHOICE COOKING APPLES.

N.B.—Quality and Size are of more merit than Colour

Class 70.—Alfriston.

1. H. H. Williams, Esq.
2. B. H. Hill, Esq.

Class 71.—Annie Elizabeth.

1. F. J. B. Wingfield-Digby, Esq.
2. Major Petre.

Class 72.—Beauty of Kent.

1. B. H. Hill, Esq.
2. J. B. Fortescue, Esq.

Class 73.—Bismarck.

1. H. H. Williams, Esq.
2. Major Petre.

Class 74.—Blenheim Orange. Large fruits. (See Class 54.)

1. H. G. Kleinwort, Esq.
2. Jeremiah Colman, Esq.

Class 75.—Bramley's Seedling.

1. B. H. Hill, Esq.
2. The Earl of Stanhope.

Class 76.—Dumelow's Seedling (*syns.* Wellington, Normanton Wonder).

1. Jeremiah Colman, Esq.
2. B. H. Hill, Esq.

Class 77.—Edward VII.

1. C. Crooks, Esq., Droitwich.
2. No award.

Class 78.—Emneth Early (*syn.* Early Victoria).
No entry.

Class 79.—Emperor Alexander.

1. B. H. Hill, Esq.
2. N. R. Page, Esq., Clacton-on-Sea.

Class 80.—Gascoyne's Scarlet.

1. B. H. Hill, Esq.
2. Major Petre.

Class 81.—Golden Noble.

1. H. H. Williams, Esq.
2. F. E. Croft, Esq.

Class 82.—Grenadier.

1. J. Lee, Esq.
2. J. B. Fortescue, Esq.

Class 83.—Hormead Pearmain.

1. G. H. Hadfield, Esq.
2. F. J. B. Wingfield-Digby, Esq.

Class 84.—Lane's Prince Albert.

1. F. J. B. Wingfield-Digby, Esq.
2. The Earl of Stanhope.

Class 85.—Lord Derby.

1. J. Lee, Esq.
2. Col. G. B. Archer-Houblon (gr. W. Harrison).

Class 86.—Mère de Ménage.

1. F. J. B. Wingfield-Digby, Esq.
2. B. H. Hill, Esq.

Class 87.—Newton Wonder.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living in Cardigan, Radnor, Shropshire, Stafford, Warwick Northampton, Bedford, Cambridge, Essex, or counties further north.

1. G. J. Gribble, Esq.
2. F. Lansdell, Esq.
3. The Earl of Lonsborough.

Class 88.—Newton Wonder.

First Prize, 20s. ; Second, 10s. ; Third, 5s.

Prizes presented by Messrs. J. R. Pearson & Sons, Lowdham, Notts.

Open only to Exhibitors living south of the before-named counties.

1. F. J. B. Wingfield-Digby, Esq.
2. The Hon. W. Lowther.
3. B. H. Hill, Esq.

Class 89.—Norfolk Beauty.

1. Col. the Hon. C. Harbord.
2. No award.

Class 90.—Peasgood's Nonesuch.

1. C. O. Walter, Esq.
2. The Hon. W. Lowther.

Class 91.—Potts' Seedling.

1. F. J. B. Wingfield-Digby, Esq.
2. J. B. Fortescue, Esq.

Class 92.—Royal Late Cooking.

No entry.

Class 93.—Stirling Castle.

1. R. M. Whiting, Esq.
2. The Earl of Devon.

Class 94.—Tower of Glamis.

1. The Earl of Stanhope.
2. The Earl of Lathom.

Class 95.—Warner's King.

1. E. W. Caddick, Esq.
2. Jeremiah Colman, Esq.

Class 96.—Any other variety not named above.

Four Prizes: 7s., 6s., 5s., 4s.

An Exhibitor may only enter one variety in Class 96, in which Class eight fruits must be shown to a dish for the Judges to be able to taste two of them.

1. F. J. B. Wingfield-Digby, Esq.
2. Jeremiah Colman, Esq.
3. Col. Archer-Houblon (gr. C. Ross).
4. B. H. Hill, Esq.

CHOICE DESSERT PEARS.

Class 97.—Beurré Alexander Lucas.

1. F. J. B. Wingfield-Digby, Esq.
2. H. G. Kleinwort, Esq.

Class 98.—Beurré d'Anjou.

1. Mrs. St. V. Ames.
2. No award.

Class 99.—Beurré Dumont.

1. No award.
2. Mr. A. R. Allan.

Class 100.—Beurré Grey—A Market Pear.

No entry.

Class 101.—Beurré Hardy.

1. Mrs. St. V. Ames.
2. Col. G. B. Archer-Houblon (gr. W. Harrison).

Class 102.—Beurré Superfin.

1. F. J. B. Wingfield-Digby, Esq.
2. Major Petre.

Class **103.**—Charles Ernest.

1. Lord Poltimore, Exeter (gr. T. H. Slade).
2. N. R. Page, Esq.

Class **104.**—Comte De Lamy.

1. T. Charlesworth, Esq., Nutfield (gr. T. W. Herbert).
2. F. J. B. Wingfield-Digby, Esq.

Class **105.**—Doyenné du Comice.

1. F. J. B. Wingfield-Digby, Esq.
2. Major Petre.

Class **106.**—Durondeau.

1. F. E. Croft, Esq.
2. Major Petre.

Class **107.**—Emile D'Heyst.

1. Col. Hon. C. Harbord.
2. N. R. Page, Esq.

Class **108.**—Fondante de Thiriot.

1. C. H. Berners, Esq.
2. No award.

Class **109.**—Glou Morceau.

1. Major Petre.
2. J. R. Brougham, Esq., Carshalton (gr. W. Jones).

Class **110.**—Josephine de Malines.

1. Earl of Pembroke.
2. F. J. B. Wingfield-Digby, Esq.

Class **111.**—Le Lectier.

1. J. B. Fortescue, Esq.
2. J. R. Brougham, Esq.

Class **112.**—Louise Bonne of Jersey.

1. Col. Sanford, C.M.G., Wellington (gr. S. Kidley).
2. Col. Hon. C. Harbord.

Class **113.**—Marie Louise.

1. Col. Hon. C. Harbord.
2. Sir H. B. Samuelson, Bart., Maidenhead (gr. A. Tidy).

Class **114.**—Nouvelle Fulvie.

1. F. J. B. Wingfield-Digby, Esq.
2. J. B. Fortescue, Esq.

Class **115.**—Pitmaston Duchess.

1. A. P. Brandt, Esq., Bletchingley (gr. J. W. Barks).
2. H. J. King, Esq.

Class **116.**—President Barabé.

1. Col. Hon. C. Harbord.
2. F. J. B. Wingfield-Digby, Esq.

Class 117.—Thompson.

1. F. J. B. Wingfield-Digby, Esq.
2. Mr. A. R. Allan.

Class 118.—Triomphe de Vienne.

1. No award.
2. Capt. Farwell, Burnham (gr. W. Hutt).

Class 119.—Winter Nelis.

1. Major Petre.
2. F. J. B. Wingfield-Digby, Esq.

Class 120.—Any other variety not named above.

Four Prizes : 7s., 6s., 5s., 4s.

An Exhibitor may only enter one variety in Class 120, in which Class eight fruits must be shown to a dish for the Judges to be able to taste two of them.

1. A. P. Brandt, Esq.
2. G. J. Gribble, Esq.
3. The Earl of Devon.
4. Sir John L. Walton, Tring (gr. J. Wallace).

GENERAL MEETING.

OCTOBER 23, 1906.

Mr. G. S. SAUNDERS, F.L.S., F.E.S., in the Chair.

Fellows elected (22).—C. Beddington, Sir B. V. S. Brodie, Bart., Dr. R. S. Charsley, Byron Gayford, H. P. Gee, Mrs. G. Henderson, T. E. Jenner, Countess of Lytton, Miss G. F. Packe, Capt. Partridge, E. Powell, Mrs. A. Crofts Powell, Mrs. Rawstorne, J. J. Reid, Rev. W. F. C. Rogers, H. E. Rutter, John Scott, Mrs. F. Abel Smith, Mrs. W. Stagg, Mrs. Tilney, Mrs. M. Walker, W. L. Watkins.

Fellow resident abroad (1).—E. J. F. Campbell (British Honduras).

Societies affiliated (2).—Bath Gardeners' Debating Society ; Dutch Gardeners' Society.

A lecture on "Horticultural Education," illustrated by lantern slides, was given by Mr. F. J. Baker (see p. 152).

GENERAL MEETING.

NOVEMBER 6, 1906.

Mr. HARRY J. VEITCH, F.L.S., V.M.H., in the Chair.

Fellows elected (20).—Arthur Bates, Mrs. Fritz Boehm, C. W. Christie-Miller, Lady Clayton, Mrs. P. Conway, A. Cross, Harry Fairhead, W. Fielden, Miss E. W. Graham, J. W. Little, G. C. Locket, J.P., Mrs. S. Low, Capt. H. Low, Miss Maitland, H. P. Maxwell, Mrs. Roderic Oliver, D. G. Purdie, A. E. Radcliffe, R. M. Routledge, Mrs. H. Sykes.

Associate (1).—A. Wood (Natal).

Fellow resident abroad (1).—Adam Alton (Australia).

A lecture on the "Chinese Flora," illustrated by lantern slides, was given by Mr. E. H. Wilson.

GENERAL MEETING.

NOVEMBER 20, 1906.

Mr. G. S. SAUNDERS, F.L.S., F.E.S., in the Chair.

Fellows elected (27).—Miss W. S. Baker, Dr. Bell, Mrs. Blair, Mrs. W. Boosey, Francis Cookson, J. Cornford, R. Craig, T. E. Crompton, T. Culver, J. S. Evans, W. Evans, Mrs. Hargreaves, W. S. Irving, Lady Jackson, Mrs. Kemmis, V. Kesterton, Mrs. McKinnon, R. K. Morecom, Mrs. M. J. Moss, Lieut. C. Kerr Pearce, Mrs. F. Platt Higgins, Col. Hurlock Pritchard, Mrs. W. H. Spottiswoode, Mrs. A. F. Stabb, Mrs. H. Thomas, Frank Turner, Mrs. C. J. H. Warden.

Fellows resident abroad (3).—Henry Deane (N.S.W.), Edward Voisin (Jersey), W. Carey Hill, (New Zealand).

Associate (1).—Avis Etherington.

A lecture on "Some recent Researches at Wisley," illustrated by lantern slides, was given by Mr. G. Masee, V.M.H. (see p. 163).

EXHIBITION OF COLONIAL-GROWN FRUIT AND VEGETABLES, BRITISH-GROWN HARDY FRUITS, AND OF HOME BOTTLED AND PRESERVED FRUITS AND VEGETABLES.

DECEMBER 4 AND 5, 1906.

JUDGES.

Bunyard, Geo., V.M.H.	Monro, Geo., V.M.H.
Butt, Geo.	Pearson, A. H.
Fielder, C. R.	Walker, A. M.
Garcia, M.	

JUDGES OF PRESERVED FRUITS, &c.

Hudson, Jas., V.M.H.	North, Emile
Marshall, W., V.M.H.	Senn, C. Herman

Gold Medal.

To the Province of British Columbia, for Apples and Pears.

To the West Indian Produce Association, for West Indian Fruits and Vegetables, Preserves, Liqueurs, Cigars, &c.

To the Permanent Exhibition Committee of Dominica, for Citrus Fruits, Pineapples, &c.

Silver-gilt Knightian Medal.

To the Government of Nova Scotia, for a collection of Apples.

To the Royal Mail Steam Packet Co., for West Indian and Australian Fruits, Vegetables, and Preserves.

To Mrs. John Smith, Spences Bridge, British Columbia, for Apples.
To the Northbrook Canning Co., Jamaica, for Tinned Fruits.

Silver-gilt Banksian Medal.

To Thomas G. Earl, Esq., Lytton, British Columbia, for Apples.

Silver Knightian Medal.

To James Johnstone, Esq., Nelson, British Columbia, for Apples.
To James Gartrell, Esq., Summerland, British Columbia, for Apples.
To the Coldstream Estate, Vernon, British Columbia, for Apples.

Silver Banksian Medal.

To J. R. Brown, Esq., Summerland, British Columbia, for Apples.
To Messrs. Stirling & Pitcairn, Kelowna, British Columbia, for Apples and Pears.

Bronze Banksian Medal.

To the Kootenay Fruit-Growers' Association, Nelson, British Columbia, for Apples.
To the Kelowna Farmers' Exchange, Kelowna, British Columbia, for Apples.
To James Ritchie, Esq., Summerland, British Columbia for Apples.

British-grown Hardy Fruits.

Gold Medal to Messrs. G. Bunyard & Co., Maidstone, for Apples and Pears.

Silver-gilt Banksian Medal to Messrs. H. Cannell & Sons, Swanley, for Apples.

Home Bottled and Preserved Fruits and Vegetables.

Class 25.—Home Bottled British-grown Fruits. *Open.*

Silver-gilt Knightian Medal to Major Hibbert, Ashby St. Legers, Rugby (gr. Mr. Nicholson).

Silver Knightian Medal to Mrs. W. H. Plowman, Beddington Corner, near Mitcham.

Class 26.—18 bottles of British-grown Fruits (including six different kinds at least).

1. Mr. W. Poupart, Junr., Fernleigh, Belmont Road, Twickenham.
2. Mrs. Vincent Banks, 102 Park Street, Grosvenor Square, W.

Class 27.—12 bottles of British-grown Fruits (including four different kinds at least).

1. Mrs. W. H. Plowman, Beddington Corner, near Mitcham.
2. John Poupart, Rēstawhyle, Effingham Road, Surbiton.

Classes 28 and 29.—No entries.

Class 30.—Home Bottled Vegetables (8 bottles, including four different kinds at least).

1. Mrs. Vincent Banks, 102 Park Street, Grosvenor Square, W.

MISCELLANEOUS.

American Preserves (including Brandied Fruits).

Silver-gilt Knightian Medal to Miss C. E. Martin, Willowbrook, Auburn, New York, for Preserved Fruits.

Pickles, Chutney, and Sauces.

Silver Banksian Medal to Messrs. Gillard & Co., De Vintry Works, Walthamstow.

Ramie Fibre.

Silver Knightian Medal to D. Edwards-Radclyffe, Esq., Hythe End, Staines.

Group of Shrubs.

Silver-gilt Flora Medal to Mr. L. R. Russell, Kew Road Nursery, Richmond, Surrey.

In connection with the Show of Colonial Fruits, &c., on December 4 and 5 the following additional Classes are offered for—

Home Bottled and Preserved Fruits and Vegetables.

Dried or Bottled Fruits and Vegetables of any kind may be shown, subject to the condition of their being tested by the Judges, and provided that they have been grown in the British Islands. Tomatoes may only be exhibited as Vegetables.

Class 25.—Home Bottled British-grown Fruits. *Open.* This exhibit must not occupy a space greater than 10 feet by 3 feet, and must not be built up more than $2\frac{1}{2}$ feet high in the centre. Bottled fruits to be in clear glass. All must be British grown and British prepared.

Medals or other prizes at the discretion of the Council.

Class 26.—18 Bottles of British-grown Fruits (including six different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade (wholesale or retail), but only and entirely for their own household consumption.

First Prize, £3 ; Second, £2.

Class 27.—12 bottles of British-grown Fruits (including four different kinds at least), bottled and shown by exhibitors who do not sell their produce or in any way work for the trade (wholesale or retail), but only and entirely for their own household consumption.

First Prize, £2 ; Second, £1.

Exhibitors may not enter in both classes 26 and 27.

Class 28.—Home Dried or Evaporated Fruits. *Open.* This exhibit must not occupy a space greater than 8 feet by 3 feet, and must not be built up more than $2\frac{1}{2}$ feet high in the centre. All must be British grown and prepared.

Medals or other prizes at the discretion of the Council.

Class 29.—Home Preserved Vegetables. (Either Bottled or Dried.) *Open*. This exhibit must not occupy a space greater than 10 feet by 3 feet, and must not be built up more than $2\frac{1}{2}$ feet high in the centre. All must be British grown and prepared.

Medals or other prizes at the discretion of the Council.

Class 30.—Home Bottled Vegetables. *Amateurs*. Eight bottles, including four different kinds at least.

First Prize, £1. 10s.; Second, 15s.

Class 31.—Home Tinned Vegetables.—(Three tins of a kind, one to be opened at the Judges' discretion.) *Open*. This exhibit must not occupy a space greater than 8 feet by 6 feet, and must not be built up more than $2\frac{1}{2}$ feet high in the centre. All must be British grown and prepared.

Medals or other prizes at the discretion of the Council.

GENERAL MEETING.

DECEMBER 11, 1906.

Mr. G. S. SAUNDERS, F.L.S., F.E.S., in the Chair.

Fellows elected (57).—Miss L. Bailey, Miss E. M. C. Balfour-Brown, Otto Beit, C. Hudson Bennett, Mrs. R. W. Blackwell, E. H. Bowers, Miss D. E. Bulwer, Mrs. W. Carpmael, Mrs. G. Clare, C. S. Gordon Clark, W. H. Cloake, Mrs. A. Colefax, Mrs. Cookson, T. Sebastian Davis, Baroness Max de Tuyll, Mrs. F. M. Dicey, T. J. Digby, W. M. Dow, Mrs. M. L. Eckhart, W. Edwards, Guy Ewing, Mrs. Francis, Cunningham Fraser, Mrs. A. Froude, C. F. Gill, Ernest Harris, Mrs. Hope, G. Reid Humphreys, Clement Janes, Henry Lamb, C. F. Lawrence, Martin Longman, Mrs. R. Luttmann-Johnson, Colin M. E. May, Mrs. J. Layton Mills, Miss M. Packe, J. Horsley Palmer, Mrs. L. Pam, A. T. Paskett, W. Penrose-Green, John Phillips, J. E. Rose, Ludwig Rosenheim, Miss M. E. Ruston, Mrs. Sebag Montefiore, Miss M. Beresford Smyly, Surg.-Gen. L. D. Spencer, Richard Staward, G. M. Steeves, Miss B. Talbot, Col. H. Torkington, John W. West, Miss W. Whitaker, James Whytock, Sir Hedworth Williamson, Bart., A. Shaw Womack, J. J. Wright.

Fellows resident abroad (4).—A. P. Maskell (South Africa), H. E. Croasdaile (British Columbia), A. Paskett (U.S.A.), J. Walling Handby (New Zealand).

Societies affiliated (4).—Castleton and District Young Men's Friendly Society, Maldon and District Gardeners' Association, St. John's Horticultural Society, Swanage Horticultural and Industrial Society.

SCIENTIFIC COMMITTEE.

JANUARY 9, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and ten members present.

Botanical Certificate.—Mr. H. J. Elwes, F.R.S., V.M.H., showed *Massonia pustulata*, a curious liliaceous plant from South Africa. The plant is by no means new in gardens, as it was introduced by Masson, and was figured in the "Botanical Magazine" more than a century ago (tab. 642, April 1, 1803); but it does not seem to have been found wild since Masson's time. Mr. Elwes's plant differs from the one originally figured in having three leaves in place of two—otherwise it agrees exactly. It has pustulate leaves, "like shagreen," as stated in the "Botanical Magazine." From the details of the flower it is evident that the plant is liliaceous, with a head of green flowers, each of which has a cylindrical perianth tube, from the edge of which proceed the six narrow spreading segments and as many stamens. The tube of the flower is filled with nectar, formed, as it would seem, from the blackish tissue at the base of the stamens. This is well described in the "Botanical Magazine" as "a clear nectareous liquid which, rising above the brim, adds to the singular appearance of the plant." The pollen grains are relatively large and ellipsoid. The genus *Massonia*, according to Mr. Baker's monograph of the *Liliaceæ*, contains twenty-three species, all natives of the Cape of Good Hope. The exact habitat of the present species is unknown. See Baker in "Flora Capensis," vi. (1897), p. 410. A warm greenhouse temperature, with plenty of water in the growing season and little or none during the resting stage, seems to be indicated. Mr. Elwes remarked that it was of exceedingly slow growth. On the motion of Mr. Douglas, V.M.H., seconded by Mr. Bowles, a Botanical Certificate was unanimously awarded.

Apple diseased.—Mr. Spencer Pickering, F.R.S., showed fruits from a tree grown in Bedfordshire, and known locally as the "ring pippin." Two trees of this variety were growing in an old orchard, and every fruit every year was grooved transversely, so that a deep ring was made in the flesh. No fruits on the trees of other varieties in the orchard were similarly affected. Other members of the Committee remarked that similarly cracked fruits were not uncommon, but that they had not seen so extensive an occurrence of the trouble. Mr. Douglas thought that cold winds in the spring were a possible cause. Mr. Massee, V.M.H., took the fruits for further examination. See p. lx.

Silver-leaf in Apple.—Mr. Pickering also reported that upon the trunk of the apple tree in Devonshire, which he had previously mentioned as being affected with silver-leaf, the fungus *Stereum purpureum*, which is so often, if not invariably, associated with the disease, had made its appearance.

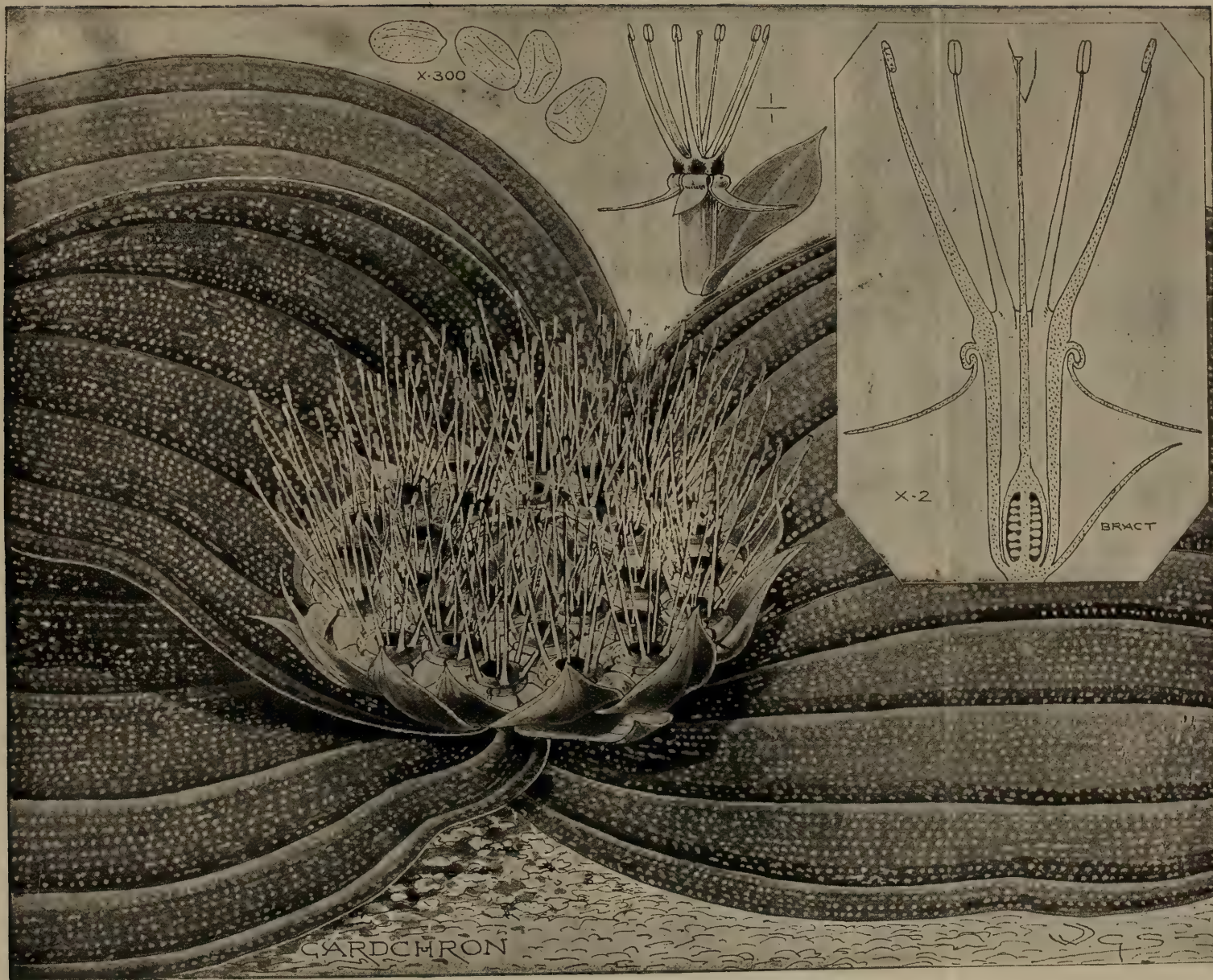


FIG. 51.—*MASSONIA PUSTULATA*. (*Gardeners' Chronicle*.)

(To face page lviii.)

Clematis Stem cracked.—Mr. G. S. Saunders, F.L.S., showed a piece of the stem of *Clematis Jackmanni* which had split open for a distance of two feet, starting about three inches above the surface of the ground. In the interior of the stem a callus-like growth had developed. The stems were referred to Mr. Massee. See p. lx.

Fruits &c. from New South Wales.—Dr. Masters showed the following on behalf of Mr. Bland, of Soham, Cambridge :—

Macadamia ternifolia ("Queensland Nut").—The tree, which belongs to the *Proteaceæ*, grows wild in the large scrub in the colony. The nuts are very nutritious and of very fine flavour, but are encased in an exceedingly hard shell, which can only be broken by the aid of a hammer.

Castanospermum australe.—The large pod of this, the "Australian chestnut," with ripe seeds, was also shown.

Gleditschia triacanthos.—Legumes of this plant, which occasionally fruits in this country.

Aleurites triloba syn. *moluccana*.—The candle-nut tree produces edible nuts, which contain a considerable quantity of oil. From the roots the Sandwich Islanders extract a brown dye.

Coffea arabica var. *angustifolia*.—Grown in New South Wales.

Dodonæa triquetra.—Fruits of this sapindaceous plant with winged carpels, giving a superficial resemblance to hops.

Panicum maximum.—A specimen of this grass, which produces three crops per annum. Stock are very fond of it. An analysis of the grass gives:—Moisture, 18·9; albuminous compounds, 7·8; carbonaceous matter and woody fibre, 58·32; mineral ash, 14·97.

Mr. Bland also sent a silken case into which pieces of twig had been interwoven, and in which a caterpillar lives. The larva suspends the case from branches, fences, &c., and protrudes its head from the opening. At the slightest noise or touch it withdraws its head instantly.

Excrescences on Loganberry.—Mr. J. S. Turner sent specimens of large, almost spherical, growths, of about three inches in diameter, on roots and stems of the Loganberry, very similar to those frequently seen on the roots of 'Maréchal Niel' roses, formed just below the surface of the soil. The formation of these swellings has been attributed to frost, or in other cases to irritation set up by a mite, a species of *Rhizoglyphus*.

Excrescences on Roots of Birch.—Mr. Notcutt, of Woodbridge, Suffolk, sent an example of a similar but much larger growth on the root of silver birch. The formation of this gall-like growth on the birch roots has been attributed to the presence of *Schinzia Betuli*.

Water for Spraying &c.—Lady St. Oswald sent the following communication concerning the rain-water supply for garden purposes :—
"We are situated in the midst of collieries, brick, coke, and other works, and we think our water supply, which is collected into cement tanks in the usual way, contains an injurious amount of sulphuric acid &c. Our reasons for thinking the water is harmful are that, when used for syringing plants and fruit trees, the points of the leaves where the water has been hanging gradually die away until nearly the whole of the leaf is gone. This has been a regular occurrence here, particularly with peach leaves. Sphagnum-moss on orchid pots and pans does not thrive, but turns brown and dies; but if the syringing is discontinued the young leaves grow

healthily. Even roots of some things unaccountably die away." It was recommended that lime should be added to the water, except that which was to be used for spraying: to this common ammonia may be added.

SCIENTIFIC COMMITTEE, JANUARY 23, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and nine members present.

Apples with Ring-like Split.—Mr. Massee, V.M.H., said that the cracks and markings on the surface of the apples shown by Mr. Spencer Pickering, F.R.S., at the last meeting were caused by the well-known parasite *Fusicladium dendriticum*. This fungus, however, was not at all concerned with the abnormal constriction of the fruit.

Clematis Stem cracked.—Mr. Massee also reported that in the clematis stems shown by Mr. G. S. Saunders, F.L.S., there was an excessive development of callus excited by the rupture of the stem. Such rupture is not caused by a fungus, and the origin is not apparent. It was suggested that frost was the cause of the splitting.

Holly Leaves blistered.—Some holly leaves with the well-known disfigurement of blisters were received from Milverton, N.B., upon which Mr. G. S. Saunders, F.L.S., reported as follows:—"The coloured blotches on the leaves are caused by the grubs of the holly fly, *Phytomyza aquifolia*, a very common insect, which lays its eggs just underneath the skin of the leaf. The young grubs at once begin to feed on the inner substance of the leaf, and cause the blister-like blotches. When the grubs become chrysalides their heads are partly pushed through the skin, so that when the fly emerges it at once does so into the open air. It is almost impossible to recommend any remedy—no insecticides can be made to reach the grubs or chrysalides—and it is a hopeless task to try to catch the flies. Spraying the leaves with a solution of paraffin emulsion at the time when the flies were wishing to lay their eggs would probably deter them from doing so. This operation is performed in May or June, according to the season, and it is very difficult to know when to spray. Picking off and burning the infested leaves is the most practical remedy. The minute pustules and depressions which are present on many of the leaves are not caused by this insect." Members of the Committee considered that the small depressions were due to the puncturing of the leaves by the spines of other leaves in windy weather.

Beans poisonous.—Mr. Holmes, F.L.S., referring to the cases of poisoning by roots of runner beans, recently brought to the notice of the Committee, mentioned a case where a herd of twenty-six cattle had been poisoned by bean-meal, and said that it could not be too widely known that uncooked beans of the genus *Phaseolus* contained prussic acid, and should on no account be eaten.

PLANTS EXHIBITED.

Debregasia velutina.—Dr. Masters drew attention to a fruiting shoot of this plant shown by Messrs. Veitch. The plant is a native of the Himalayas, and bears numerous small orange-yellow mulberry-like fruits

in small clusters. The plant belongs to the *Urticaceæ*, and the fruits are edible, but "are not much appreciated." It was figured in the "*Revue Horticole*," 1896, p. 321.

Hæmanthus magnificus.—This plant, with a large head of pinkish flowers, was shown by Mr. Hudson.

Tulip 'Proserpine'.—Mr. Horne, of Thurstaston, near Birkenhead, sent two examples of this tulip, each of which bore three flowers, one, as usual, terminal, and one springing from the axil of each of the upper two foliage leaves. The production of more than one flower on a stem of tulip is not very unusual.

SCIENTIFIC COMMITTEE, FEBRUARY 13, 1906.

Dr. M. C. COOKE, V.M.H., in the Chair, and eighteen members present.

Apples with Median Lateral Groove.—In reference to these shown on January 9 by Mr. Spencer Pickering, Mr. G. S. Saunders, F.L.S., showed figures of some fruits collected some time ago at Cheltenham deformed in a similar manner, except that the groove ran round the apple in a spiral manner.

Grubs in Stem of Common Laurel.—From R. W. Bourne, Esq., of Bishopstoke, came specimens of insects taken from the stem of the common laurel, and branches showing aerial roots from the surface similar to those so frequently found in this shrub when grown in damp close situations. Mr. Bourne stated that the grub, which was small and white, but later brown, "appeared to work upwards and to kill the branch by destroying the inner part of the bark, the leaves on the attacked branches turning yellow and dying. Branches about $1\frac{1}{2}$ inch or more in diameter are usually attacked." Mr. G. S. Saunders reported that the laurels are attacked by the larvæ of a small moth, one of the *Tortricinæ*, most probably *Semasia wæberiana*; but the insects cannot be the direct cause of the outgrowths, as they are found on pieces of the shoots which are not attacked by the caterpillars, but they are probably formed indirectly from this cause. The burrows of the larvæ may weaken the branches to some extent by cutting off the food and water supply, and they may in self-defence, as it were, start these adventitious roots.

Galls on Ash.—Mr. G. Nicholson showed terminal growths of ash which had been malformed and caused to produce numerous lateral and adventitious buds through the attacks of the mite *Eriophyes fraxini*. This particular gall appears more rare than many caused by the attacks of other members of the genus.

Vines attacked by Weevils.—Dr. Masters drew attention to some young shoots of vine which had just started, but which had been bitten completely through by a weevil, probably *Otiorhynchus sulcatus*.

Pelargonium diseased.—Mr. Worsley showed leaves of a zonal pelargonium which were spotted with numbers of small brown dry spots. Mr. Worsley said that the disease spreads rapidly, and that eventually the plant died as a result of the attack. Mr. Massee, V.M.H., took the leaves to examine further. See p. lxiv. Mr. Worsley also showed some mealy bugs which had come from Jamaica with bananas. Mr. Saunders took them to examine. See p. lxiii.

Galls on Birch.—Mr. Hans Gussow showed some of the large malformed growths which are so common on the silver birch, where the buds are injured by mites, and as a result produce numberless lateral and adventitious buds, forming a confused mass of growths similar to those shown by Mr. Nicholson on the ash. The mite in this case is *Eriophyes rudis*.

Scale on Willow.—Mr. Lynch, V.M.H., who was heartily congratulated by the Committee on the occasion of his receiving the Victorian Medal of Honour, showed shoots of willow badly attacked by a scale insect, *Chionaspis salicis*, Linn.

Variation in Potatoes.—Dr. Masters commented on the remarkable exhibit of potato varieties shown in the hall by Messrs. Sutton. Mr. A. Sutton, V.M.H., drew special attention to *Solanum Commersonii* and to a specimen of the tubers raised by M. Labergerie, which that gentleman called *S. Commersonii* 'Voilette,' as he considered it to have originated as a sport from *S. Commersonii*. M. P. Vilmorin, who had grown *S. Commersonii* for many years (and, like others, had never found any sporting proclivities in that species), regarded the alleged sport as a tuber of the 'Blue Giant,' which has been in cultivation for a long period, and which had by some accident got mixed with the tubers of *S. Commersonii*. Mr. Sutton showed 'Blue Giant' and the alleged sport side by side, and pointed out that the slight differences between the two were only such as might be expected when two examples of the same variety grown in widely separated districts were shown side by side. Mr. Worsley said that M. Haeckel claimed to have obtained intermediate forms between *S. Commersonii* and the alleged sport, and Mr. Sutton said that M. Labergerie considered that he had seen the sport reverting completely to *S. Commersonii*.

PLANTS EXHIBITED.

Mr. R. I. Lynch, V.M.H., of Cambridge, showed a flowering specimen of *Alpinia officinarum*. Hence the "radix galangæ minoris" of the pharmacologists, a plant that very rarely flowers in this country.

He also showed some specimens of *Rosa laevigata*, a large-flowered species of rose, which he thought would be useful in corridors.

Crocus veluchensis, Herb.—This Grecian species, now for the first time seen in cultivation, was shown by Mr. A. E. Bowles, F.L.S., who compared the actual specimens with the published figures. The present species differs from *C. vernus* and *C. banaticus* in its diphyllous proper spathe and in the absence of basal spathe; from *C. Sieberi* (specimens of which were also shown) in the absence of the yellow spots in the throat and in the small corm.

Dr. Masters showed flowering specimens of *Daphne odora*, which proved perfectly hardy in the open; *Prunus Mume*, one of the Japanese plums; and *Jasminum primulinum*, a newly introduced Chinese species—all cut from the open ground, and sent by Mr. Veitch, of Exeter.

Mr. A. Sutton, F.L.S., showed specimens of *Pleione yunnanensis*, Rolfe, which had been sent to them by a missionary from China, and had been grown on by them. The greater number of species of this genus are native in the mountains of India, but this came from farther to the

north-west, and was taller than the majority of the Indian species. On the motion of Dr. Masters, seconded by Mr. Druery, a Botanical Certificate was unanimously awarded to this plant.

American Blight on Apples.—From L. L. Savill, Esq., came shoots of apple badly attacked by the well-known American blight. He remarked upon the fact that the tits seem particularly fond of pecking the swellings and canker-like growths produced by this pest on the branches, and presumably devouring the aphides.

Celery woody and spotted.—F. A. Gregson, Esq., of Cranleigh, sent celery, complaining that the plants were always woody, and lacked the nutty flavour which is desirable, this being specially the case when the crop was grown on sand, less so when it was grown on clay. The members of the Committee considered that in all probability the defect was due to lack of water during the hotter part of the year.

Orchids with Spots on Leaves &c.—E. F. Clark, Esq., of Chamonix, Teignmouth, sent parts of orchids, chiefly Cattleyas, which were spotted and deformed in growth. While fungi were certainly present in some of the spots, it was thought that the primary cause of the trouble lay not so much with the fungus as with a too wet compost and lack of air to the roots, and possibly a too damp atmosphere.

SCIENTIFIC COMMITTEE, MARCH 6, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and fifteen members present.

Mealy Bug on Bananas.—Mr. G. S. Saunders, F.L.S., reported that the mealy bug on bananas from Jamaica shown by Mr. Worsley at the last meeting appeared to belong to the same species as the commonest of our greenhouse mealy bugs (*Dactylopius longispinus* syn. *D. adonidum*, or *Coccus adonidum*).

Grubs in Ash Stem.—Mr. Saunders also reported that the ash shoot from Dunmow had been bored "by one of the small fossorial *Hymenoptera*, probably one of the many species of *Crabro*. These insects fill the cells which they make with insects to supply their grubs with food. Having formed the cell and duly provisioned it, the female lays an egg in it and seals it up, and forms another just above it, treats it as she did the first, and goes on in this way until she has completed her task. In this instance one of the grubs had died before it had consumed its stock of provisions, and the cell was more than half full of the remains of a number of small dipterous flies; from the other cells the perfect insects had made their escape, and the cells only contained empty pupa cases."

*Variation in *Narcissus princeps**.—Mr. E. H. Jenkins, of Hampton Hill, sent specimens of this well-known narcissus having the corona contracted at the mouth. Dr. Masters said this condition was due in all probability to the plant having received some check during its development, but exactly at what stage and from what cause was not apparent. The specimens differed from the typical *princeps* in being paler, both in the corona and perianth; but, as Mr. Jenkins pointed out, the height, flimsy perianth segments, flat stem and leafage, were unmistakably those

of *N. princeps*. He also said that he had been able to select from these he had grown two pale-yellow selfs, another with segments almost as white as in *Horsfieldii*, another having much bigger bulbs than is usual in *N. princeps*, and still another which retains its foliage when all others have disappeared, all these being apparently sports from *N. princeps*. In addition to this, a sport has been selected having a frilled rim to the corona: this has proved constant, and the stock is increasing.

Oranges decaying.—Mr. Chittenden reported that some navel oranges had been received from the Western Orchards Produce Company, with the request for some information as to the cause of the rot that had set in. He had reported that the oranges are attacked by the fungus *Penicillium*, a frequent cause of loss with oranges. The trouble usually appears after the oranges are packed and on their way to England, and this appears to have been the case with those sent. Navel oranges are very frequently attacked, the open eye of this fruit forming a convenient place for the entry of the minute fungus spores; sometimes, indeed, they are infected before they leave the orchard, but more frequently in the packing-house. After packing, the disease may spread throughout a box from one fruit to the next.

The conditions for the growth of a fungus such as this are, particularly, the presence of moisture, warmth, and a suitable substance upon which to grow. In the navel orange a drop of water will often condense in the open end, and there the fungus finds a very suitable place for growth.

The best means of preventing the growth of the fungus in the fruits appear to be as follows:—(1) Wrapping fruits in tissue paper, a means which, combined with some amount of ventilation in the boxes, has proved, within certain limits, valuable as a preventive of decay. (2) Careful destruction of decaying fruit (by deep burial or by fire) in the orchard or the packing-house, since by this means the number of spores likely to be floating in the air will be greatly reduced. (3) This should be combined with disinfection of the packing-houses, either by thorough drying, by whitewashing, or by burning sulphur therein.

Galls on Bramble.—Dr. Masters showed, on behalf of Mr. Nicholson, galls on bramble very similar to those shown at the last meeting on ash and birch, and caused, like them, by a species of mite, *Eriophyes*.

Palm Leaves diseased.—Dr. Masters also showed some leaves of a palm apparently attacked by a fungus, which Mr. Massee took to examine. See p. lxvi.

Primula sinensis malformed.—Mr. Odell showed specimens of this plant (intermediate between the *stellata* group and the ordinary *sinensis*) having green or purple flowers in which the calyx had become foliose, the ovary had grown into a tube, but contained no ovules, while the stamens were present. Dr. Masters took them for further examination. See p. lxvi.

Pelargonium Leaves diseased.—Mr. Massee said that the leaves Mr. Worsley had shown at the last meeting were not attacked by a fungus, but that the brown spots upon them had evidently been produced by a concentration of water at these points owing to an interference with proper transpiration. Chlorosis had also occurred. It was found that watering with a 1 per cent. solution of sulphate of iron and the standing

of the plant in abundant light would cause growth to proceed in a proper and healthy manner.

Beetle Grubs in Elm Bark.—Lieut.-Col. Rogers sent elm bark bored by the grubs of a beetle, which Mr. G. S. Saunders took to examine further. See below, March 20.

Hardy Eucalyptus.—Messrs. Treseder & Co., of Truro, sent branches of a *Eucalyptus* from their nursery, an introduction from Australia, which they say has stood twenty degrees of frost without injury. Some account of the tree is given in *Gardeners' Chronicle* (July 1, 1905, p. 3), with a figure of the young state, which is somewhat like that of *E. cordata*. Messrs. Treseder have given the name *Eucalyptus Beauchampiana* to this form, but it is probably referable to *E. cinerea*, F. v. Muell. See Bentham, "Flora Australiensis," iii. 239 [*E. pulverulenta* is closely allied, if not identical]. In the mature state the leaves are linear-lanceolate, of a glaucous-green with a reddish tinge, and about 3 inches long.

Soil uncongenial.—A sample of soil with roots of plants quite dead or dying was received. On using the soil a second time after rest it was found that the roots of cucumbers, melons, violets, tomatoes, Roman hyacinths, &c. were quite destroyed. Mr. Chittenden said he had tested the soil, and found that it contained abundance of lime, so that the death of the roots could not be put down to soil acidity. Mr. Douglas, V.M.H., pointed out that there were pieces of clinker and cinder in the soil, and the presence of these suggested sulphur as a possible cause of injury.

Cultures of Nodule Bacteria.—Mr. Chittenden said that experiments had been carried out in Essex during the past year with cultures of nodule bacteria from America and Germany on beans, peas, lucerne, clover, &c., but in every case without yielding any increase in crop, either in pot cultures or in the field, in spite of the fact that in every case the cultures were proved by means of control cultures to be alive and capable of vigorous growth. Dr. Somerville said that this had been the experience throughout the country, just as it had with "nitragin" a few years ago.

SCIENTIFIC COMMITTEE, MARCH 20, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and some fifty members and visitors present.

Beetle in Elm Bark.—Mr. G. S. Saunders, F.L.S., reported that the piece of elm bark sent by Lieut.-Colonel Rogers from Sevenoaks was "attacked by the grubs of the elm bark beetle, *Scolytus destructor*. This pest is a very difficult one to destroy, as the grubs live in positions in the bark in which it is impossible to make any insecticide reach them. About sixty years ago some elm trees in Regent's Park were very badly attacked by this insect, but they were saved by paring off the bark until the grubs were exposed, when the trees were dressed with a mixture of lime and cowdung; the grubs being exposed to the weather would have died even if the trees had not been dressed. The trees made a good recovery. I cannot suggest any other means for killing the grubs. It is an open question whether these grubs ever injure really healthy trees, for

the flow of sap in a vigorous tree would probably be very inconvenient to the insects, flooding their burrows with sap. The numbers of this insect in existence would be very much diminished if more care were taken to remove all dying elm trees, and at once strip off the bark and burn it. All branches which are broken off should be treated in the same manner, and no elm timber with the bark on should be allowed to lie about, as is the case very frequently at present, forming centres for the propagation of this and other insect pests."

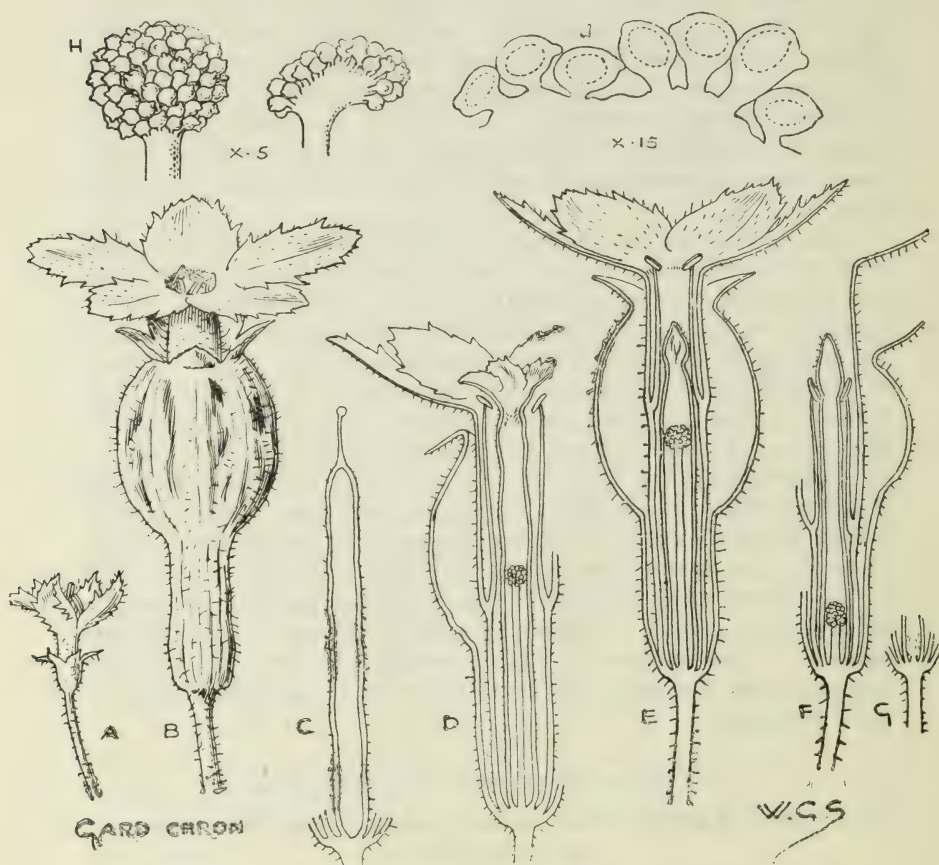


FIG. 52.—MONSTROUS CHINESE PRIMROSE, WITH CALYX AND COROLLA LEAFY, AND OVARY PROLONGED WITH A LONG TUBE &c. (Gardeners' Chronicle.)

Palm Leaves diseased.—Mr. Massee, V.M.H., said that the brown blotches on the palm leaves shown by Dr. Masters at the last meeting were due to the fungus *Pestalozzia phœnicis*, a true parasite forming large blotches on the foliage. The fungus is closely allied to *P. Guepini*, a destructive parasite on tea. See JOURN. R.H.S. vol. xxviii. pp. 325, 326.

Primula Sport.—Dr. Masters reported as follows on the flowers of *Primula sinensis* shown at the last meeting by Mr. Odell:—"It was, in some respects, intermediate between the *stellata* forms and the ordinary

sinensis, and the foliage and stem were of a deep reddish-purple colour. (Fig. 52, B.)

"But the greatest peculiarities were observable in the flowers. No two flowers showed exactly the same conditions, but, speaking generally, the calyx was much enlarged, distended at the upper portion, and of a purple colour. Within the calyx was a corolla, the limb of which projected beyond the calyx and consisted of five purplish hairy lobes. (Fig. 52, B, D, E.)

"Within the corolla and detached from it, except at the extreme base, were five stamens opposite the corolla lobes, with hairy filaments and abortive anthers occupying the mouth of the tube (thrum-eyed), or in some flowers not projecting beyond the tube. (Fig. 52, F.)

"Within the stamens was the ovary, elongated into a long pod-like organ (fig. 52, C) with a short style, more like the pod of a crucifer than the usually globose ovary of a primrose. In some flowers, instead of a short style, the ovary terminated in five petal-like lobes. (Fig. 52, D.) The placenta, instead of being raised on a long shaft, is almost sessile. Within the ovary was a basal placenta, column-like in form, and of varying length in different flowers. (Fig. 52, D, E, F, G.) This shaft-like placenta was surmounted by a globular head of ill-formed ovules." (Fig. 52, H and J.)

Fungus on Elder.—Mr. Spencer Pickering sent a specimen of the Jew's-ear fungus, *Auricularia mesenterica*, growing saprophytically on elder.

Abies nobilis attacked by *Chermes*.—From Mrs. Bramwell, of Worcester, came shoots of *Abies nobilis* with galls caused by the attack of *Chermes abietis* or *laricis*, a fly allied to the aphid, which passes part of its life-history on the *Abies*, part on the larch. No efficient remedy for use when large trees are attacked is known.

The Mendelian Laws of Inheritance.—Mr. C. C. Hurst gave a lecture on the "Mendelian Laws of Inheritance," illustrating his remarks by means of the blackboard, numerous specimens being drawn from a wide range of subjects, afterwards pointing out how the time of fixing any variation might be lessened, and the fixing be a matter not of chance but of certainty. See p. 227. Mr. Chapman said he considered that the degree of development of certain characters depended very largely upon cultivation, and Mr. Worsley said that there appeared to be an innate tendency of plants to vary, which was often lost sight of by experimenters. Mr. Crawshay said that in his experiments with *Odontoglossums* the law of dominance was clearly demonstrated. Mr. Elwes thought the laws could hardly yet be said to be settled. Mr. Hurst, in briefly replying, dealt with several of the apparent objections brought forward, and acknowledged the hearty thanks tendered to him for his lucid exposition of the laws.

SCIENTIFIC COMMITTEE, APRIL 3, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twelve members present, with Mrs. Scott as a visitor.

Photographs of Movements in Plants.—The Chairman introduced Mrs. Dukinfield H. Scott, who explained the method of taking several successive

photographs of plants on a large sensitive plate at frequent intervals, so that the photographs could be shown continuously on a screen by means of a cinematograph, and thus illustrate the nature and extent of the movements performed by the different parts of plants.

Potato Scab and "Rhizoctonia."—Mr. Gussow referred to the potatoes covered with a violet web of fungal hyphæ belonging to the fungus *Rhizoctonia* shown before the Scientific Committee on October 24, 1905, and reported upon at the meeting on November 7, 1905. See JOURN. R.H.S. xxxi. pp. lxxxviii and lxxxix, and said that he had been conducting experiments, which showed that this fungus produces the well-known scab disease on potatoes. See report in "Journal, Royal Agricultural Society," vol. lxvi. (1905), pp. 173-177, with figures. He referred to some independent investigations upon the same fungus, carried out by Mr. F. M. Rolfs, of the Colorado Agricultural College, whose careful observations are published in "U.S.A. Experimental Station, Colorado," Bulletins 70 and 91. These observations seem hitherto to have escaped notice in this country. Mr. Rolfs has carried on his observations during three years, and has placed it beyond doubt that the fungus known as *Rhizoctonia violacea* is the cause of the potato scab in America. He has also cleared up the mystery of the "sterile mycelial fungus," as this has been called, by finding the fruiting stage, which proves it to belong to the *Hymenomycetes*, and to agree with the fungus called *Corticium vagum*. Dr. E. A. Burt calls it var. *solani* of that fungus. Thus a very interesting fact has been arrived at, and, although Mr. Gussow is well aware of the numerous other fungi to which the scab disease has been attributed, he considers there is no doubt that the real cause has now been finally ascertained. It is interesting, said Mr. Gussow, to observe that Mr. Rolfs succeeded in 203 cases out of 225 in producing the disease from the basidiospores and the sclerotia of the *Corticium*, and he finds that dipping the seed potatoes into a weak solution of corrosive sublimate (1 oz. to 10 gallons of water) efficiently checks the injury: a fact of great importance.

Galls on Spruce and Yew.—Galls on spruce and yew were shown by Mr. Hooper.

Fruits of Leucadendron.—Dr. Masters showed some fruits of the silver tree, *Leucadendron argenteum*. The flowers are unisexual. The abortive stamens in the female flowers are covered with long silky white hairs, and are united at the base around the wiry style from which the fruit depends, the style being prevented from passing through the hole where the staminal lobes are joined by the button-like stigma. Thus the whole forms a parachute apparatus by means of which the dispersal of the fruit is assisted.

Double Spathe in Anthurium.—Herr Froebel, of Zurich, sent a specimen of the inflorescence of *Anthurium Scherzerianum* in which the spathe was doubled, the second and smaller spathe being separated from the lower by an internode of about $\frac{1}{2}$ in. The second spathe had not yet expanded.

Sporting in Calceolaria.—Mr. Shea drew attention to a curious herbaceous *Calceolaria* shown by Mr. Riley, of Oakfield, Walton-on-Thames, one side of which bore yellow flowers, while the greater part—

about two-thirds—bore pinkish flowers, some of which, however, had a patch of yellow upon them. The variation was very similar to that in the cockscomb shown by Mr. Sutton at a meeting of the Committee on October 24, 1905. See JOURN. R.H.S. xxxi. p. lxxxviii.

Tropical Fruits.—Mr. Worsley exhibited a pineapple from Natal which was peculiar in having the horny processes at the ends of the bracts more highly developed than usual. He suggested that it might be derived partly from *Ananas macrodontes*. There was a pleasant flavour and a marked absence of woody fibre.

Leaves &c. injured.—Mr. Jenkins sent leaves of ivy-leaved Pelargonium upon which were brownish warts, which later dropped out, leaving a small hole. Fuchsias, Hydrangeas, and other plants were similarly affected in the house. Mr. Gussow took them to examine further. Numerous other specimens of diseased plants were received from different correspondents.

PLANTS EXHIBITED.

1.—Mr. Worsley drew attention to some plants of *Tulipa dasystemon* (Regel) shown by C. J. van Tubergen, F.R.H.S., of Haarlem, Holland. This tulip is a native of Siberia, is dwarf in habit, and bears flowers of a yellowish colour and very sweet-scented. One of the bulbs exhibited carried five flowers.

2.—*Sansevieria Laurentii* (De Wild). A species from the Congo, introduced from Stanleyville, Stanley Falls, by the late Prof. Laurent in 1904, having erect leaves, about 18 inches in length, margined with yellow.

3.—*Ficus* (?) *Dryepontiana* (De Wildeman), from the same district as the last. A handsome foliage plant, with bold dark green bullate leaves, red beneath, and with narrow membranous stipules. To this a Botanical Certificate, as an interesting novelty, was awarded on the motion of Dr. Masters, seconded by Mr. Gussow. The last two plants were shown by the Director of the State Botanic Gardens, Brussels. The *Ficus*, if *Ficus* it be, is figured in the last number of the "Revue de l'Horticulture Belge."

SCIENTIFIC COMMITTEE, APRIL 17, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eight members present.

Roots of Gardenia dying.—Roots of *Gardenia* in a dying condition were received, and were referred to Mr. G. S. Saunders, F.L.S., for further examination. See p. lxx.

Auriculas and Inheritance of Characters.—Mr. Douglas, V.M.H., drew attention to some show Auriculas, pointing out the characters that the florist aimed at procuring. He also showed a truss of flowers, all except one of which were self-red, the exception being a yellow flower. By raising seeds from red flowers crossed by red a large number of yellows are produced, while if two show flowers with dark ground are crossed, usually light-coloured flowers are found in the seedlings.

Destruction of Wild Flowers.—A letter on this subject was read from Miss Trower, who remarked on the wholesale destruction of such plants

as primroses and other wild flowers by hawkers and by visitors to the country. Prof. Bouiger said that there might possibly be some legal enactments before long upon the subject, and that the Devon County Council were endeavouring to get a by-law, dealing with the uprooting of wild flowers, sanctioned by the Home Secretary.

Rhododendron arboreum.—Mr. Duncan Davidson sent flowers of this Himalayan species from Dingwall, where a specimen is growing in a shrubbery on strong clay at about 400 feet above sea level, and half a mile from the sea. The tree is about 20 feet to 25 feet in height, and as much through, the stem at the ground level measuring 36 inches in circumference. The tree is planted on the north side of a clump of other rhododendrons, about 20 yards through, and is sheltered on the north by conifers and shrubs. It usually flowers at the end of November on to the end of March or beginning of April.

Narcissus with leafy Spathe.—Mr. Jenkins, of Hampton Hill, sent a specimen of *Narcissus princeps* in which the usually membranous spathe had become leafy, and was hooded in shape at the apex. As Mr. Jenkins remarked, the corona had suffered in making its escape from the sheath, being considerably contracted on one side.

Ochna multiflora.—Dr. Masters drew attention to this plant exhibited by Mr. Charles Turner, of the Royal Nurseries, Slough, which had received a First-class Certificate in 1879, but was little seen in gardens. The main peculiarity lay in the fruit. The flower is somewhat inconspicuous; but as the fruit ripens the calyx becomes enlarged and bright red, and the receptacle also becomes red and very fleshy.

SCIENTIFIC COMMITTEE, MAY 1, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and seventeen members present.

Gardenia Roots dying.—Mr. G. S. Saunders, F.L.S., reported that he had carefully examined the roots of *Gardenia* shown at the last meeting, but could find no trace of eelworm. A fungus of some kind was, however, present, which might account for the death of the roots.

Variation in Ferns.—Mr. H. B. May showed examples of crested forms of two species of *Nephrolepis*—*N. exaltata* and *N. rufescens*—both of which bore curious tassel-like growths. He remarked that he had not seen anything of the kind in exotic ferns before; he found that the tassels die after being in existence a short time. Mr. Druery, V.M.H., said that, although such variation in exotic ferns was new to him, he had found a similar thing to occur in British ferns—e.g. in *Athyrium*, *Lastrea montana*, and *Scolopendrium*. He considered that the formation of the tassels was due to the growth of the nerve beyond the region of development of the flattened portion of the frond and its subsequent repeated branching. He thought their early death was to be explained by the fact that they must be functionless.

Variation in Colour of Tendrils of Sweet Peas.—Mr. Cuthbertson drew attention to the fact that some varieties of sweet peas had from their earliest growth a reddish tint in their tendrils, while others were

quite green, with the object of ascertaining whether anyone had discovered the significance of this variation.

Fruit of Lilium candidum.—Dr. Masters showed a ripe capsule of *Lilium candidum* containing a few apparently well-formed seeds among a large number of imperfectly formed ones. Rev. W. Wilks said that numbers of capsules were produced at Wisley on this lily, but he did not know whether they contained any perfect seed. Mr. Elwes, V.M.H., said that plants had been raised from seed produced after artificial fertilisation.

Pinus sylvestris destroyed by Beetles.—Mr. Saunders took some specimens sent from Suffolk, and will report upon them later. See p. lxxii.

Convolvulus azureus Leaves injured.—Leaves of a plant of *Convolvulus azureus* which had been inadvertently left in a cucumber-house were sent by Mr. A. C. Barlett, of Pencarrow Gardens, Cornwall. Many spots were present on the leaves, and from the centre of each a rather large black projection arose. These spots are caused by a checking of transpiration, and the production of warts, or “intumescences,” as a consequence, and are quite similar to those shown recently on Pelargonium, Hydrangea, and Fuchsia. A proper balance between heat, moisture, and light must be maintained if such unhealthy growth is to be avoided.

Vines dying back.—Some vine shoots, the leaves of which became brown first at the edges, then farther back, were received. Mr. Massee took these for further examination. See p. lxxii.

Richardia Elliottiana malformed.—Mr. E. H. Jenkins, F.R.H.S., of Hampton Hill, sent a curious malformation of *Richardia Elliottiana*. In the place of leaves were long narrow structures resembling petioles, and in one case a much attenuated growth with wavy margins; and while the spadix appeared to be properly developed, the spathe was reduced to a thread-like outgrowth about $3\frac{1}{2}$ inches in length. The corm and roots were normal.

Plants &c. exhibited.—*Cypella Herberti*. Mr. Worsley showed an inflorescence of this curious and beautiful South American irid, *Tropæolum Lobbianum* \times *T. canariense*. He also showed flowers of this cross, and remarked that while in summer the flowers produced were of a bright red, in winter the petals were usually margined with yellow. He found that the flowers borne by plants raised from cuttings of this plant varied considerably, and passed specimens round in illustration of his remarks. He also showed a flower of a *Tropæolum* having two spurs. The stem bearing it appeared to be fasciated, and the plant from which it came was raised from a cutting taken from a fasciated stem, *Deutzia scabra*. Dr. Masters drew attention to the true *D. scabra* shown by Messrs. Paul & Son, Cheshunt, and pointed out that the plant usually grown under that name was really *D. crenata*, a species with which it has long been confounded.

Ceanothus Fendleri.—He also commented upon this plant, which, unlike other members of the genus, has a grey bark, is spiny, and bears white flowers. It is a mountain plant, and comes from the South-Western States of North America.

Fritillarias.—Mr. Elwes, V.M.H., showed several “species” of *Fritillaria*, and said that he thought that in all probability many were geographical forms of one species. He thought this to be the case in

all probability with *F. acmopetala*, *F. Elwesii*, and *F. pontica*, all of which came from Asia Minor. Other species shown were *F. Whittallii*, *F. Kotschyana*, *F. messanensis*, and *F. pallidiflora*.

Deodars dying suddenly.—Mr. Elwes remarked that his attention had recently been called to several deodars, of considerable size, which had died quite suddenly. The trouble could not be attributed to uncongenial soil or to climate, and nothing seemed to be known as to the cause. Mr. Worsley said that he had known of similar sudden death in *Sequoia*, *Libocedrus*, and *Biota*.

Change under Cultivation.—Mr. Elwes showed flowers of a *Bomarea* in order to illustrate the great changes occurring in a species when brought under cultivation. He collected the seeds at Rio Janeiro, and the plants when raised bore quite small flowers, but now the flowers were very much larger, and differed in colour, and the leaves greatly exceeded the originals in size. The plants, however, which had been kept in pots, still bore small leaves and flowers. The species had been determined to *B. edulis*, but after cultivation it nearly approached *B. Carderi* in appearance.

SCIENTIFIC COMMITTEE, MAY 15, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present,
with M. P. de Vilmorin visitor.

Beetles on Pine.—Mr. Saunders, F.L.S., reported that the trees from Brandon Park shown at the last meeting are attacked by the pine beetle, *Hylurgus piniperda*. The best thing that can be done is to go carefully through the plantation and pull up and burn every tree that shows the least signs of being infested by this insect. The grubs, which do far more harm to the trees than the parent beetle, cannot be reached without barking the trees. It is certain that this insect does not attack healthy trees unless there are no dead or dying ones for them to breed in; so that in a plantation, when a tree begins to show signs of want of vitality, it should at once be removed.

Injured Vine Leaves.—Mr. Massee, V.M.H., said concerning those referred to him at the last meeting:—"There is no specific injury caused by fungi or insects. The discoloration is due to sunlight falling on leaves covered in places with a film of moisture. Ventilation in the early morning would prevent this."

Coloured Tendrils of Sweet Peas.—Referring to this matter, raised at the last meeting by Mr. Cuthbertson, Mr. Bateson, F.R.S., writes:—"We have kept note of this character as far as possible in our work. The red tendrils are (? always) associated with red in the axils of the leaves. In our records we have spoken of this feature as 'dark axil,' the opposite as 'light axil.' The 'dark axil' character may be present in any sweet pea, whether the flowers are coloured or white, but it is not developed unless the flower is in some degree coloured, we believe. There are 'whites' with dark axils, e.g. the black-seeded form of 'Mrs. Sankey'; but we think the whitest of such flowers always have a trace of colour in the keel. At all events, there is no dark-axil plant which does not have a black seed-coat."

The following table shows the various results occurring in the crosses. The first distinction to be drawn is between whites bearing *the dark-axil character*—call it (D), or its absence (d). By crossing with a coloured flower light-axil variety the point can be settled, for the (D) white will then give a dark-axil cross-bred, whereas the (d) white gives a light-axil cross-bred thus :—

Coloured flower (d)	×	white (D)
F ₁		coloured flower, dark axil

But :

Coloured flower (d)	×	white (d)
F ₁		coloured flower, light axil

Then :

Coloured flower dark axil	×	white (D)
F ₁		coloured flowers, dark axil
F ₂	3 coloured flowers : all dark axil	1 white light axil (D)

But :

Coloured flower dark axil	×	white (d)
F ₁		coloured flowers, dark axil
F ₂	9 coloured flowers dark axil	3 coloured flowers light axil
		4 white

These four white are all alike in appearance, but are really

1 D D (pure to dark axil) : D d (crosses
between dark and light axil) : 1 d d
(pure to light axil).

Excepting in rare and doubtful cases, white-flowered plants have light axils, but they may possess the factor which gives dark axils *if it meets flower-colour*. There are thus two kinds of white-flowered plants :—

- A. White-flowered *bearing* D, the dark-axil factor.
- B. White-flowered *without* D.

Both A and B have light axils in fact, and to the eye, but if A be crossed with a coloured-flowered, light-axil variety, F₁ will be coloured-flowered with dark axils ; while if B be crossed with the same coloured-flowered, light-axil variety, F₁ will be coloured-flowered with light axils. In the case where two whites crossed give a coloured F₁ this will have dark axil or light axil, according as one or both of the whites bore dark axils or neither.

If neither bore dark axils this F₁ will have light axils, though the flowers are coloured.

It follows that every light-axil plant must breed true to light axil, but

- 1, breed true to dark axil
- or 2, give 3 dark : 1 light
- or 3, give 9 dark : 7 light
- &c. &c.

Tropæolum with Two Spurs.—Mr. Worsdell, F.L.S., said that several theories had been brought forward as to the morphological value of the spurs of *Tropæolum*. Some had regarded the spur as an outgrowth of the axis of the flower, and the flower with two spurs had been regarded as supporting this theory, since if the spur were an outgrowth of the calyx a multiplication of spurs would apparently involve a splitting of the calyx, which had not occurred in the case under investigation.

Solanum Commersonii and its alleged Sports.—M. P. de Vilmorin, who was heartily welcomed by the Chairman in the name of the Committee, contributed some remarks upon the alleged sport of *Solanum Commersonii*, a matter which has already been brought before the Committee by Mr. Sutton and others. Mr. Sutton suggested that the Wisley Sub-Committee should be requested to grow side by side for comparison M. Labergerie's violet variety and 'Blue Giant,' which it so greatly resembles.

Uredo Polypodii on Cystopteris.—Professor Boulger showed a specimen of this rust fungus from Matlock growing on *Cystopteris fragilis*.

Galls on Gooseberry.—Mr. Saunders, F.L.S., showed some gall-like growths from a gooseberry bush, the whole of the bushes in the garden being similarly affected. These growths were attributed by some members to a *Phytoptus*, but none was to be seen at this stage, and by others to injury by frost, followed by a great production of callus.

Reversion in Auricula.—Mr. Douglas, V.M.H., showed an Auricula bearing yellow flowers with serrated edges, almost identical with figures published 170 years ago of *Primula Auricula* in size, colour, and form of flowers. It was an interesting example of atavism, since it was raised from seed of a show type of Auricula having an even white edge and an almost perfectly black ground.

Insects eating Iris.—The grub of a moth which was found eating *Iris sibirica* and *I. Delavayi*, but not other species, was sent by Mr. G. Yeld, of York. Mr. Saunders took the specimen for further examination.

Irises dying.—Through Mr. Lynch came specimens of *Iris spuria* var. 'A. W. Tait,' from Rev. Rollo Meyer, of Amptill, Beds, the stems of which were rotting, the leaves being marked with pale spots; other species had been attacked, and where the "German" Irises were the victims the rhizome became affected as well as the lower part of the leaf. Lime had been found to improve the plants greatly. Mr. Nicholson said that some years ago at Kew many Irises were similarly affected, and the trouble was then found to be due to the attacks of a bacterium, and lime proved a good specific in that case also.

Fungus Galls on Azalea.—Dr. Masters showed galls on the buds of *Azalea indica* received from Bruges as large as filbert nuts in the husk, and of a pale green or reddish colour, though otherwise similar to those

seen on some species of *Rhododendron* caused by *Exobasidium Rhododendri*.

Abnormal Growths.—Mr. Holmes, F.L.S., sent a very fasciated specimen of *Fritillaria Imperialis* bearing three or four times the normal number of flowers; also pale pink flowers of the common bluebell, a wild form which had remained constant for four years; and a specimen of the well-known 'Jack-in-the-Green' primrose, but having eight sepals and six petals.

PLANTS EXHIBITED.

Richardia Rehmanni.—A plant of this species with puce-coloured spathe came from Col. C. O. Hore; it is rarely seen in cultivation. Mr. R. Irwin Lynch, V.M.H., of the Cambridge Botanic Gardens, sent a large number of rare and interesting plants as follows:—*Sandersonia aurantiaca*, a climbing liliaceous plant, very interesting, for comparison with its near allies *Littonia* and *Gloriosa*, the foliage being very similar in these three distinct genera; *Gladiolus tristis*, which proves hardy on a border beneath a wall; *Lonicera thibetica*, a newly introduced plant (see "Revue Horticole," 1902, p. 448), quite unlike the majority of the honeysuckles; *Erinacea pungens*, a beautiful plant with inflated pale greenish calyx tinged with heliotrope, and a darker corolla, coming between *Ulex* and *Spartium*; *Coronilla Emerus*, from a plant collected at Interlaken; *Cotyledon undulata* ("Botanical Magazine," t. 7931); *Lathræa Clandestina*, a parasite on roots of willow, with beautiful rosy-lilac flowers and white bracts (see "Gardeners' Chronicle," 1904, May 7, p. 292); *Solanum Xanti* (fig. in "Botanical Magazine," t. 7821), a Cambridge introduction; *Heterotoma lobelioides*, the "Bird Flower" of Mexico, a curious plant, belonging to *Campanulaceæ* ("Botanical Magazine," t. 7849); *Richardia cantabrigiensis* (*R. Rehmanni* × *R. melanoleuca*), a hybrid raised at Cambridge, showing intensification of the pink colour of the female parent; *Tropæolum azureum*, a rare and beautiful greenhouse perennial from Chili; *Fendlera rubicola*, allied to *Philadelphus* and *Carpenteria*, a native of Texas and Mexico ("Botanical Magazine," t. 7924); *Bomarea patacensis*, Herbert (Amaryl., 120, t. 14), = *B. conferta* of "Gardeners' Chronicle," 1882, 186, t. 31; *Centaurea crassifolia*, with very fleshy leaves, peculiar to Malta, a sub-shrubby plant introduced by Rev. Professor Henslow; *Orobanche ramosa flore albo*; a good yellow form of *Pæonia Wittmanniana*; *P. Emodi*, a very tender plant, and the beautifully coloured *P. officinalis lobata*; *Iris Korolkowi* and the beautiful hybrid forms *I. Korolkowi* × *iberica*, *I. Korolkowi* × *vaga*, *I. paradoxa* × *Korolkowi*, *I. iberica* × *pallida*, a very fine and easily cultivated border plant (these hybrids were of Sir Michael Foster's raising); *I. biflora gracilis*, probably a hybrid between *I. virescens* and *I. nudicaulis*; *I. benacensis* (not yet figured), an early flowering sweet-scented purple species; *Anthemis Cupaniana*, a species which Mr. Lynch believes to be new; *Cheiranthus mutabilis*, one of the parents of *C. kewensis*; *Euphorbia polychroma*, *E. spinosa*, and *E. serrata*. A vote of thanks was unanimously accorded to Mr. Lynch for his kindness in sending the interesting plants mentioned above.

SCIENTIFIC COMMITTEE, JUNE 12, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present.

Iris diseased.—The Irises shown at the last meeting from the Rev. R. Meyer have rotten stems, the rhizomes as well as the basal part of the leafy shoots being affected, and the plants finally died; they were reported upon by Mr. Massee, V.M.H., as follows:—"The Iris has the bacterial disease badly. No name seems to have been given to the germ, but the disease was worked out by Dr. Hewlett. Nothing can be done now to the plants but to remove the diseased rhizomes and fill the holes with quicklime. Next spring, before the plants move, two inches of the surface soil should be removed and replaced by an equal mixture of fresh soil and quicklime." The disease seems to be very prevalent this season, and another specimen was received on this occasion from Chingford.

Gardenias dying.—Mr. Massee also reported that "there was no specific disease present in the Gardenia, but that it was a case of imperfect cultivation. Gardenias are always difficult to manage, and neglect in watering is strongly resented."

Diseased Deodars.—Mr. Massee said that the deodars from Devon were under examination, and that he would report upon them in due course.

Insects eating Iris.—Mr. Saunders, F.L.S., said that "the caterpillar attacking *Iris Delavayi*, from York, is that of the iris wainscot moth, *Nonagria Sparganii*, which feeds upon the common yellow Iris and on other species. Handpicking is the only means of dealing with the pest. The moth is a reddish-yellow one, measuring about an inch and a half across the open wings."

Potatoes failing.—Potatoes which had failed to grow, and others which had produced very weak, spindly shoots, were received from two localities—Romford (Essex) and Affpuddle (Dorset). Concerning the former the sender says:—"The potatoes sent are of the variety called 'Empress Queen.' They are from new Scotch seed grown in Fifeshire, and planted in well-cultivated soil. They have been planted two months, and only about half of them are through the ground, most of those that are up being very weak. Those that are not up have in some cases not started to grow, and look as if they never would do so, while others are growing very weakly, and the sprouts seem to have some disease in them. They appear to grow a certain length and then the stems go rotten, and in some cases a weak sprout shoots out again. There are nine acres so affected." Concerning those from Dorchester the grower writes:—"Several lines of potatoes have been irregularly affected in the manner of the tuber enclosed (having a very large number of weakly shoots), and others in the neighbourhood are suffering in a similar way. The seed appears sound and good, but, while part of the row comes through all right, there are gaps where the first sprouts die away, and only the second (sometimes none) come through. A patch of 'May Queen' is quite unaffected, and all were treated exactly alike. The seed is fresh from Lincolnshire this year." It was remarked that investigations in France had shown that this failure to grow was due to the fact that

the starch could not be converted into sugar, and therefore could not be used by the plant for purposes of growth. Why this was so had not been ascertained. Certain crosses were always found to be affected in this way.

Flowers of Broad Bean malformed.—Some curiously malformed flowers of broad bean were received from Mr. James Douglas.

Tulip Disease.—Lady Binning sent specimens of tulips badly attacked by the tulip mould, *Sclerotinia parasitica*. This fungus frequently attacks the tulip, forming olive-brown velvety patches on the stem, leaves, and flowers. At a later stage smooth lentil-shaped lumps or sclerotia (resting bodies), at first grey, then black, appear, mostly in the outer parts of the bulb, sometimes being so numerous as to form black crusts. When the mould is first observed the plant should be taken up and burned to prevent the formation of sclerotia, some of which are often produced in the soil close to the bulb, and thus endanger the subsequent crop. The top layers of soil to the depth of about two inches should be removed in winter, and a fresh dressing of soil containing as little organic matter as possible should be substituted. The admixture of lime with this soil will assist in checking the disease. See JOURNAL R.H.S. xxvi. p. 45.

Diseased Pelargoniums.—Pelargoniums attacked by *Botrytis cinerea* were received from Isleworth. Spraying with sulphide of potassium and giving as much air as possible were recommended.

SCIENTIFIC COMMITTEE, JUNE 26, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present.

Azalea dying.—From Rugby came an Azalea which had suddenly gone off. No fungus or insect could be detected thereon, and it was the opinion of the Committee that death was due to allowing the plant to become dry at the roots at some time.

Clematis "sporting."—Mr. Gordon, V.M.H., showed double pale-lilac flowers of Clematis which had appeared on two Clematis plants, which last year bore the usual dark flowers of *Clematis Jackmanni* and a small white flower respectively. It was thought that in all probability the flowers had been produced by the upgrowth from the stock on which the Clematis plants which flowered last year had been grafted.

Ascidia on Plumeria.—Mr. J. W. Odell showed some curious examples of these cup-like growths proceeding from near the base of the leaf-stalk of *Plumeria lutea*, looking exceedingly like stipular growths. Such structures are common on cabbages, lettuces, and pelargoniums, but do not appear to have been recorded hitherto in *Plumeria*.

Shoot of Hyacinth growing downwards.—Professor Boulger said his attention had been called to the growth of a hyacinth the bulb of which had been scratched out of the soil, and had lain on the surface with the shoot (which had just started growth) pointing downwards. The shoot continued to grow downwards to a depth of about 8 inches, and produced flowers, which, however, were not coloured. Professor Henslow said that he showed a plant with a similar growth some years ago. In

that case, however, the bulb had been planted upside down. It would appear that in such cases the power of response to the stimulus exercised by gravity is very slight.

Yellow Rose from Palestine.—Mr. A. W. Sutton, V.M.H., read a letter from a correspondent concerning a yellow rose which grew near Baalbec, specimens of which he also showed. Dr. Masters recognised the rose as *Rosa lutea*, and Sir John Llewellyn said he had seen it growing so profusely on the northern slopes of Mount Lebanon as to make a mass of colour visible at the distance of a mile.

Seedling of Delphinium Belladonna.—Mr. Sutton also showed flowers of some seedlings raised from seed produced by *Delphinium Belladonna* last year. This has not been known to produce seeds, at least since 1857, when the first record of the plant seems to have been made. A few seeds had been produced in the previous year, but none of these had proved fertile. The flowers of some of the seedlings resembled *D. Belladonna* very closely, but some more nearly approached *D. formosum*, and one bore flowers of a very beautiful deep blue tint.

Cannibalism among Caterpillars.—Mr. Spencer Pickering, F.R.S., said that in the course of some experiments with insecticides several larvæ of the winter moth had been kept together in captivity, and in one of the cages a caterpillar had devoured all its companions and others which had been supplied to it; eleven had been devoured in all, and the cannibal had grown to about four times its normal size. It has now turned into a chrysalis. It will be interesting, said Mr. Pickering, to see whether the progeny of the moth will also possess carnivorous habits. It was remarked that several species of caterpillars showed cannibalistic propensities under certain circumstances. Mr. Holmes thought this was the case particularly when water was withheld from them.

"Silver-leaf" in Plums.—Mr. Spencer Pickering also said that he had been conducting experiments with this disease, which had been attributed to the fungus *Stereum purpureum*, a specimen of which he showed from a diseased tree at the meeting of the Committee on October 24 last. See JOURN. R.H.S. xxxi. p. lxxxvii. A plantation of 112 young plum trees had been made, and of these seventy-four had not been inoculated with the fungus, while thirty-eight had small pieces of the fungus inserted in their stems. Of the former none had developed the disease, while of the latter twenty-eight showed the characteristic silvering of the foliage within six weeks of the inoculation. This experiment confirms the results already obtained by Professor Percival.

Diseased Irises &c.—Mr. Worsley sent rhizomes and flowering stems of *Iris pallida* and *Iris cuprea* apparently attacked by the bacterial disease of Iris, concerning which a communication was read from Mr. Massee at the last meeting. Mr. Worsley said that his stock of *I. pallida* had been destroyed, most of *I. cuprea*, and all of *I. Milesii*, while some of *I. gigantea* had been killed, and *I. chinensis* injured. *I. germanica* seems almost immune in his garden, while *I. foetidissima* and *I. Pseudacorus* are entirely so. He also sent leaves of *Crinum yemense*, from outdoors and under glass, with leaves dying and becoming soft. *C. Powellii*, *C. scabrum*, *C. giganteum*, and several others had been similarly affected, but none of the plants had died. *C. Moorei* seems exempt. Dead leaves

of *Cordyline indivisa vera* came from the same source, and *C. australis* had been attacked in the same manner. These plant diseases will be reported on at a future meeting.

Pæonies dying.—Mr. B. C. Williams, F.R.H.S., of Henington, Dorchester, sent specimens of pæony attacked by the fungus *Botrytis Pæonia* (*Sclerotinia Pæoniae*). The shoots droop before the flower opens, and just above the surface of the soil a white web of fungal thread may be seen spreading over the surface of the stem. Later, resting bodies or hard lumps (sclerotia) of a black colour are formed both above and below the surface of the soil. The diseased shoots should be removed and burnt as soon as discovered, and fresh stable manure should not be used for mulching. If plants have been attacked, it is well to remove the old soil from about them and replace it with fresh soil with which lime has been mixed. This should be done in the spring.

Plants exhibited.—A newly introduced *Begonia*, *B. Poggei*, from Kasai, Congo, having deep green leaves about 4 inches in length and 2 inches in width, only slightly oblique at the base, and small pink flowers in lateral clusters, the pistillate flowers having a fusiform ovary nearly 1 inch in length, showing no trace of the wings that are usual in the genus, was shown by the Director of the Botanic Gardens, Brussels. A Botanical Certificate was unanimously awarded to this plant on the ground of novelty and curious structure.

Abnormal Flowers of the Foxglove.—Mr. C. W. H. Greaves, of Pwllheli, North Wales, sent drawings illustrating the abnormal flowers of a self-sown foxglove (*Digitalis purpurea*). The plant is a vigorous one, with normal foliage and eight racemes bearing some forty or fifty flowers each. A few of the flowers at the lower part of the raceme are normal, but the majority on each raceme exhibit the following marked variations (from the normal). The corolla is markedly bilabiate, the odd (anterior) petal hanging down in a manner suggestive of the labellum of certain orchids. The filaments of the anterior pair of stamens—which are usually parallel to those of the posterior pair—curve outwards sharply at the points, where the upper and lower “lips” of the corolla diverge. The most curious feature, however, is that at the anterior edge, and near the tip, of each of the antero-lateral petals there is a single well-developed anther lobe. The latter are of the usual yellow colour with purple spots, and they contain pollen grains which appear quite normal under the microscope. There is no indication of filaments leading up to these anther lobes. The peculiar interest of these abnormal flowers appears to me to lie in the staminoid petals; for, although petaloid anthers are of quite common occurrence, the converse metamorphosis is, in my experience at any rate, a rarity. I may add that the plant bearing these flowers has possibly been superfed by the somewhat free use of liquid manure; but this, according to the generally accepted theory, should have induced what Goethe would have termed “retrogressive” metamorphosis, instead of the opposite tendency here exhibited. See Henslow in “Journ. Linn. Soc.” xix. 1882, p. 216.

Abnormal Growth of Rhododendron.—Dr. Masters showed a drawing of a shoot of *Rhododendron* (*R. Aucklandii* × *R. Fortunei*), from Sir E. G. Loder, Leonardslee, Horsham, cut from a plant about twenty years

of age, bearing solitary, imperfect, axillary flowers in the axils of leaves of the current season. The shoot was much elongated, and showed a case of precocious flowering, the flowers, which should normally have opened next season, having developed this. The specimen was, moreover, particularly interesting from the fact that not only had the shoot elongated, but the bud scales had developed in the form of foliage leaves; the flowers were distorted in various ways.

Diseased Plants &c.—Several other examples of diseased plants were exhibited, including vine leaves with warts, vine leaves attacked by red spider, apple leaves with *Fusicladium*, &c.

SCIENTIFIC COMMITTEE, JULY 17, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eight members present.

Remarkable Seedling Picotee.—Mr. Douglas, V.M.H., showed a curious plant raised from seed of a yellow ground picotee crossed by pollen from a similar flower. The parents had long robust leaves, and were of the usual habit of the group, while the seedling had a very tufted habit, very much shorter and narrower linear leaves, much more glaucous than the parents, and small yellow semi-double flowers having slightly notched petals, the teeth being tinted red. The plant grew for three years before producing flowers, whereas one year is the usual period. There seems to have been no chance of cross-breeding having occurred with another species,

Variation in Pinks.—Mr. Douglas also showed an interesting group of flowers from pinks grown from seed of the best varieties to demonstrate the exceeding variability in the flowers, both in the amount of doubling and the form and coloration. A considerable number revert to the single form.

Lateral Proliferation in Carnations.—Mr. Douglas also showed examples of a yellow carnation in which the axis had branched at the base of the flower, producing a considerable number of lateral buds, a condition very frequently seen in roses. A vote of thanks was unanimously accorded Mr. Douglas for his interesting exhibits.

Malformation in Pea.—Mr. A. W. Sutton, V.M.H., showed a pea plant where the flowers were abortive in a similar manner to those seen in the bean shown on June 12 by Mr. Douglas. This condition, which affected all the flowers on the plant, and on this plant only out of many thousands growing in a field, is said to be brought about by the presence of a species of gall-mite (*Eriophyes*).

Fasciation in Mangold.—Mr. Sutton also showed a remarkable specimen of this common phenomenon in a mangold, where the flower-bearing stem measured nearly two inches in diameter.

Virescent Clover Heads.—Heads of *Trifolium repens*, in which some of the floral parts had been transformed into foliaceous leaves, were also shown by Mr. Sutton. This well-known peculiarity has been proved to be due to the presence of an insect in the stem, probably *Hylastinus obscurus*, Marsh. See M. Molliard in *Comptes Rendus*, November 1904, p. 980, and JOURN. R.H.S. xxix. (1905), p. 924.

Tuberous Solanums.—Mr. Sutton also showed a very interesting series of plants of tuber-bearing *Solanums*, together with water-colour drawings showing habit &c.

1. Wild types of the following species raised from seed sown in March 1906, and planted in the open in May.

(a) *Solanum tuberosum*, the true wild type now cultivated possibly for the first time in this country, raised from seed. The plants did not exceed 8 inches in height.

(b) *Solanum verrucosum*, about the same height as the preceding, but very different in habit.

(c) *Solanum polyadenium* (Greenman), collected in September 1904. A very hairy species.

In all these three cases the specific types of *Solanum* have reproduced themselves absolutely true from seed without any variation whatever. This is the more remarkable because in no single case does the cultivated potato of commerce come true from seed, and very seldom, if ever, does any individual seedling raised from a seed-berry (often containing two hundred seeds) from the cultivated potato at all closely resemble its parent. The seedlings from the above three types are all equally true to the parent forms.

2. Specific forms of tuber-bearing *Solanums* raised from tubers, with illustrations of habit.

(a) *Solanum Maglia*, as received about twenty years ago, and grown since then in Reading.

(b) *Solanum etuberosum*, as received about twenty years ago.

(c) *Solanum*, a type or species known as 'Papa d'Amarilla,' bearing a great resemblance to the type of *S. tuberosum* mentioned above. Mr. Sutton had never known this variety to produce seed.

(d) *Solanum Commersonii*, the type as grown at Reading for several years.

3. Specimens of 'Blue Giant' and of M. Labergerie's so-called *Solanum Commersonii* 'Violet variety.'

(a) The potato 'Blue Giant' raised from tubers supplied by the raiser, Herr Paulsen, of Germany.

(b) The 'Blue Giant' raised from tubers received from M.M. de Vilmorin, of Verrières.

(c) M. Labergerie's so-called *Solanum Commersonii* 'Violet variety' raised from tubers received direct from M. Labergerie's agent.

(d) M. Labergerie's so-called *Solanum Commersonii* 'Violet variety' raised from tubers received from M. P. de Vilmorin, of Verrières.

The last four specimens showed the extraordinary effect produced upon a crop of potatoes by the variation in soil or locality in which the tubers producing such a crop were grown.

The two specimens of 'Blue Giant' and the two specimens of the alleged variety of *Solanum Commersonii* differed from each other much more than the specimens of 'Blue Giant' differed from the *Solanum Commersonii* 'Violet variety' of Labergerie grown in similar soil. Indeed, these two alleged different varieties were practically alike in appearance.

Malformation of Potato Flower.—Mr. Sutton also showed an inflorescence of the potato 'Up-to-Date,' in which one of the flowers had the

petals partially converted into stamens, the remaining flowers being normal. This inflorescence was taken from the plant which bore flowers all having a similar malformation shown by Mr. Sutton before the Committee on August 1, 1905. See JOURN. R.H.S. xxxi. p. lxxxi.

Pisum sativum.—Mr. Sutton also showed a specimen of *Pisum sativum* grown from seed collected by him from a plant growing semi-wild in a vineyard near Jaffa. The plant was about a foot high, had much serrated leaves and stipules, coloured flowers, and short curved pods. It had been crossed with the 'Duke of Albany' pea, and had produced a tall plant (which was also shown) somewhat intermediate in the foliage, having a dark-coloured spot in the axil of the leaves, coloured flowers, and intermediate somewhat curved pods.

A hearty vote of thanks was accorded Mr. Sutton for his numerous and interesting exhibits.

Colour in Sweet Pea Tendrils.—At a recent meeting (May 1) Mr. Cuthbertson raised the question of the correlation of the red or green colour of the tendrils in certain varieties of sweet peas with other characters in the plant. He now sent specimens illustrating the possibility of the practical utility of attention to this character as an aid in "roguing" in the young stages of growth. A row of the pea 'Captain of the Blues' was carefully examined some time before flowering, and one plant that differed from all others in having green tendrils instead of red was marked. The flower of the normal 'Captain of the Blues' has blue wings and a darker standard, while the marked plant was white marbled with blue all over. It is interesting to note that, as Mr. Bateson has previously pointed out, the red colour of the tendrils is usually correlated with a dark spot in the leaf axil, but in this variation the leaf axil possessed the dark spot which is found in all normal specimens of 'Captain of the Blues,' although no trace of red colour was to be seen in the tendrils. Mr. Bateson has shown that the green tendril (light axil) character is a recessive one, and Mr. Chittenden remarked that while in all the so-called sports of 'Countess Spencer' which he had seen the tendrils were green, and the axils of the leaves devoid of the dark spot, 'Countess Spencer' itself had red tendrils and dark-axilled leaves.

Flowering of Dasyllirion glaucophyllum.—The following interesting note was sent by Lady Theodora Guest, of Inwood, Templecombe:—"The Mexican *Dasyllirion glaucophyllum* has thrown up an immense flower stalk in the conservatory here. It has grown some 16 feet in a fortnight, and is now covered with flower buds all up the stalk. A record is preserved of its flowering at Kew in 1857, when it attracted considerable attention, but Lady Guest believes that the flowers have rarely been seen in England."

The rate of growth recorded shows more than half an inch per hour maintained for a fortnight.

Axillary Proliferation of Cornflower.—Dr. Masters showed a specimen of *Centaurea Cyanus* from Mr. W. G. Smith, in which flower-bearing branches proceeded from the first-formed flower head somewhat in the manner seen in the 'Hen-and-Chickens' Daisy.

Diseased Peaches.—Specimens of peach leaves attacked by the shot-like fungus *Cercospora circumscissa*, came from near Redhill, and shoots

of peaches showing brown spots at the base of the leaves and dropping their foliage as a result of the attack of the fungus *Botrytis cinera* on the imperfectly ripened wood. The only thing to be done is to cut out all diseased shoots and burn them, and then spray the trees with a rose-red solution of potassium permanganate.

SCIENTIFIC COMMITTEE, AUGUST 14, 1906.

Mr. G. MASSEE, F.L.S., V.M.H., in the Chair, and seven members present, with Mrs. E. Hancock visitor.

Diseased Crinum and Cordyline.—Mr. Güssow reported that he had examined these shown on June 26 by Mr. Worsley, but had been unable to find on either any parasite to which the death of the plants could be attributed.

Reversion in Picotee.—Concerning the plant shown by Mr. Douglas at the last meeting, Mr. F. Williams, F.L.S., writes :—"The stem sent to me bears a female flower only, and the styles are very much coiled, as is so frequently the case when only female flowers are produced. From the clear and interesting history given with the plant, the result is not at all a matter of surprise. It is certainly a curious result. It is an attempt on the part of the seedling at atavistic reversion to simpler type—of a form of reversion so lucidly described by Mendel in his experiments on hybridisation, and to which I have drawn attention in reviews of Mendel's work in the "Journal of Botany," and in an explanatory note in my "Prodromus Floræ Britannicæ," Part III. The whole energy of the plant was directed to modification—and a very marked one—of its nutritive organs at the expense of the development of its floral organs. . . . The whole of its energy of growth was expended in the modification of the leaves. . . . Even when the flower is produced it is (in the specimen sent) an imperfect one. No doubt it was less coddled in its cultivation than other specimens, and so took the opportunity in a hardier environment to revert to a similar type. I have before pointed out that pinks resent coddling as much as they can; the natural habitat of all species of *Dianthus* is in exposed situations—slopes of hills facing the wind, edges of rocks, overhanging ledges, unprotected banks, and open sandy ground. Altogether the specimen has a much more wild appearance than its somewhat artificial origin suggests."

Smut in Carnation.—Mr. Massee, V.M.H., reported that flowers of carnation "Miss Audrey Campbell" with discoloured centres were "attacked by the fungus *Ustilago violacea*, and to the presence of this fungus the discoloration was due. The spores of the fungus are produced in the anthers. In several of our wild plants belonging to the pink family this disease occurs, and in those instances the mycelium is perennial in the root. Hence it appears every year, and a plant once infected remains so for life."

Malformed Inflorescences.—Mr. Odell showed some specimens of *Trifolium repens* virescent, similar to those shown at the last meeting by Mr. Sutton. He said that he found it much more frequently in temporary

than in permanent pastures. He also showed *Plantago major* with virescent flowers, and *Scabiosa atropurpurea* in which the central florets were displaced by long green bracts.

Damaged Cactus Stems.—From Teignmouth came shoots of *Phyllocactus* showing brownish spots of somewhat irregular shape, and nearly a quarter of an inch in diameter. In the centre of each was a dark spot looking like a puncture. These were no doubt caused by punctures from the spines on neighbouring shoots, and by the production of cork on the part of the plant in its efforts to heal the wound made by the spines.

Buds on Inflorescence of Saxifrage.—Mr. E. H. Jenkins, of Hampton Hill, sent a specimen of *Saxifraga Cotyledon*, received from Bavaria, in which a large number of small rosettes of leaves had been produced in the axils of bracts on the axis of the inflorescence. He said that the occurrence was very frequent this year with this species, and suggested that "by reason of the incessant rains experienced there the functions of the flowers were interrupted, or their power of forming seeds destroyed. Possibly the pollen had been washed away or injured, and no seeds were formed. The flowering stems, remaining green beyond their usual time, directed their energies to the formation of these small rosettes."

Montbretias dying.—Plants of *Montbretia* with foliage dying and turning a dark-brown colour came from Chingford. The trouble seems common this year, and appears to be a physiological one rather than one due to any specific organism. The best plan to adopt in order to avoid its occurrence appears to be to move the plants at least every two years; plants left for a longer time very frequently succumb to the disease.

Bean Anthracnose.—Specimens of runner beans were received from Plympton badly affected with bean anthracnose caused by the fungus *Colletotrichum Lindemuthianum*. The disease is described, and treatment indicated in JOURN. R.H.S. xxvii. (1902), p. 809.

Melampyrum arvense.—Mr. Chittenden showed specimens of the purple cow wheat (*Melampyrum arvense*), a somewhat rare semi-parasitic cornfield weed in England, from an Essex locality, together with the seeds, which bear a remarkable resemblance to dark grains of wheat.

Solanum Commersonii.—Mrs. Hancock gave an interesting account of the way in which she introduced this plant, which has recently been the cause of a considerable amount of discussion among growers of potatoes, particularly on the Continent, into her garden from M. Labergerie's garden at Verrières after the Brest Conference. She first received it in January 1904, and has succeeded in establishing it thoroughly well in her garden at Horeham Road, Sussex, and has since been able to distribute a considerable number of tubers to different parts of the country. She finds it will withstand a greater degree of cold than do the varieties of *S. tuberosum*. Her remarks were illustrated by a photograph of the plant growing, specimens of the plant in flower, and with immature fruits and tubers of a considerable size. She had cooked the tubers and found they possessed no bitter flavour.

SCIENTIFIC COMMITTEE, AUGUST 28, 1906.

Dr. MAXWELL MASTERS, F.R.S., in the Chair, and six members present.

Melon Leaves.—Mr. Massee, V.M.H., reported that the leaves submitted to him were sun-burnt, and that there was no fungus present.

Diseased Deodar.—Mr. Massee reported that the trees were attacked by a species of *Rosellinia*. Leaflet No. 64 of the Board of Agriculture and Fisheries gives an illustrated account of the fungus and the method of combating it.

Japanese Iris.—Some specimens in a diseased condition sent from Romsey were referred to Mr. Massee. See p. lxxxvi.

Aërial Roots on Vines.—The following communication was read from the Rev. Professor Henslow:—

“Going over a florist's grounds and houses lately at Kenilworth, the florist called my attention to a peculiar coincidence. In a long row of vines, only one had aërial roots, and the grapes on that plant only were much in advance in size (all were green) as compared with all the rest in the house. The root has a thin-walled epidermis, the cells, of a thick cortex and pith, being three-walled, very compact and full of water (no starch being present), with a feebly developed zone of phlœum and xylem. On allowing a root to lose some of its water by evaporation, I placed it in water for twelve hours, the cut end being in air. It gained 80 per cent. of its weight in recovering its former condition. I shall be glad to hear if other vine-growers have noticed a similar coincidence, and, if so, whether they could trace any cause and effect.”

Potatoes.—Mr. Arthur Sutton, V.M.H., exhibited fruits of *Solanum Commersonii* with well-marked, heart-shaped, somewhat flattened berries; berries of *S. polyadenium*, *S. verrucosum*, and of a reputed wild form of *S. tuberosum* were also shown. Two berries were exhibited from M. Labergerie's variety which were of a globose form, quite like those of an ordinary potato. No fruits had up to the present been observed on plants of 'Blue Giant,' and up till 1904 M. Labergerie reported no fruits had been seen on his potato. In the "Journal of the Société Nationale d'Agriculture de France" M. Labergerie reports this year that the fruits on his potato are not round, but pointed or heart-shaped, like those of the wild type, and when they approach the round berries of our potatoes they still have a characteristic *sillon* or indentation. Mr. Sutton also showed various drawings to scale, by Mr. Worthington Smith, of *S. Commersonii* and its assumed derivative. The form of the pollen-grains and of the hairs on the petals was particularly interesting. Dr. Masters showed tracings and drawings of most of the species and varieties inspected near Reading by certain members of the Committee recently, when the members present failed to perceive any material difference between M. Labergerie's variety and 'Blue Giant,' whilst both were widely different from *S. Commersonii*.

Aristolochia elegans &c.—Mr. Worsley showed flowers of this species from the vicinity of Rhodes's tomb in Rhodesia, to which locality it must have been introduced from Brazil. The West African *A. Goldieana* was

also noticed as spreading widely in Africa. Fruit pods of *Ceropegia Woodii* were also exhibited, presenting the usual cylindrical narrow form.

Leaves of Planes.—Mr. Hooper called attention to the singular provision for the protection of the buds at the base of the petiole, and asked for other examples of a similar kind.

Various diseased Leaves.—Mr. Saunders, F.L.S., exhibited leaves affected by a species of *Psylla*, box leaves affected with *Sphærulina Buxi*, and violet leaves attacked by *Cercospora Violæ*.

The late Prof. Marshall Ward.—On the proposition of the Chairman, it was decided to send a letter of condolence to the widow of Professor Marshall Ward, for many years a valued member of the Committee.

The late C. B. Clarke.—Reference was also made to the death of this distinguished botanist.

SCIENTIFIC COMMITTEE, SEPTEMBER 25, 1906.

Mr. G. MASSEE, F.L.S., V.M.H., in the Chair, and nine members present.

Diseased Iris from Romsey.—Mr. Massee reported that the disease of Iris referred to him at the last meeting was due to the fungus *Heterosporium gracile* (Saccardo). The best treatment is to spray early in the season with dilute Bordeaux mixture. Other fungicides seem to be of no avail against this fungus. Injured leaves should be cleared away, otherwise there will be a return of the disease next season; probably even with these precautions the disease will recur.

Injury to Chrysanthemum Leaves.—Mr. Holmes, F.L.S., showed leaves of chrysanthemum having pale-brown patches and lines upon them, particularly near the midrib. Mr. Saunders took them for further examination.

Montbretias dying.—Mr. E. A. Bowles, F.L.S., showed some further specimens of dying Montbretias similar to those shown on August 14, in which the first symptom of trouble is the browning of the leaves. The disease appears to be a physiological one, no specific organism, either animal or vegetable, having been found associated with it.

Rust on Plum Leaves.—Mr. J. Douglas, V.M.H., showed shoots of plum very badly infested with the plum rust, *Puccinia Pruni*. No leaves should be allowed to remain on the ground through the winter, as upon these the spores of the fungus hibernate, and the trees should be sprayed with a fungicide in the spring.

'Wheatear' Sweet William.—Mr. Douglas also showed on behalf of Rev. W. Wilks an inflorescence of Sweet William, in which all the flowers were malformed as in the 'Wheatear' carnation, the bracts being repeated again and again at the expense of the flower.

Black Fungus on Apple Leaves.—Apple leaves covered by a black sooty material were received from Bramerton, Norwich. The cause of the appearance was the presence of a species of *Fumago* upon the leaves, a fungus which grows upon the honeydew formed through the attacks of aphids. Attention should be paid to keeping the aphids in check. The variety 'King of the Pippins' was the one chiefly attacked.

Apples and Wasps.—Rev. Professor G. Henslow sent some apple skins left after wasps had consumed the whole of the cellular tissue, abandoning the core and particles of grit which formed a layer at the bottom. After falling from the tree the skins became the domiciles of earwigs. He also sent the following note:—"It has occurred to me that the presence of 'grit' disclosed by the wasps not being able to eat it (but undiscoverable to us human beings, being too small) proves the last differentiation between apples and pears to go! I take it that 'grit' is the degraded state of an original stone fruit, the cores being the internal lining only of the carpels. In a pear which has decayed the grit is clustered round the five carpels, resembling that of other stone fruits; but in apples it has degraded so much further that only wasps can discover it!" The members of the Committee agreed with Dr. Masters who wrote:—"This is a most ingenious idea; but as the 'grit' or mechanical tissue in a pear is not confined to the neighbourhood of the carpels, but diffused in the parenchyma, and especially beneath the epidermis, I cannot quite see how it can be phylogenetically connected with the stone. The 'grit' is an integral portion of the fruit branch, not of the carpels."

SCIENTIFIC COMMITTEE, OCTOBER 9, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and nine members present.

The late Professor Marshall Ward.—The following letter from Mrs. Ward to the Chairman was read, and ordered to be inscribed on the minutes:—"Will you kindly convey to the members of the Scientific Committee of the Royal Horticultural Society the gratitude of myself and my children for their kind sympathy and appreciation? Such an honour truly reflects the esteem in which my dear husband was held by his colleagues, and we greatly prize the expression of it from your Society. Permit me also to convey our thanks to you personally as Chairman."

Blisters on Pear Leaves.—Mr. G. S. Saunders, F.L.S., reported that the blisters on the pear leaves from Ulverston were the work of the caterpillars of a small moth, one of the *Tineinae*, which burrows between the skins of the leaves, feeding on the parenchyma of the leaf. The insect pupates in the soil. Removing the surface soil to the depth of 2 inches and burning or burying it deeply would probably prevent the tree from being attacked again next year. If the tree is infested next season, the affected leaves should be picked off as soon as the attack is noticed—spraying would not be of any use.

Imperfectly formed Acorns.—Mr. Saunders showed some acorns in which the growth had evidently been arrested at an early stage. They were from *Quercus rubra*. No member present knew whether the species produced perfect fruit in this country, but it was thought that the arrest of growth was due to uncongenial climatal conditions.

Intoxication of Bees.—Mr. Saunders also showed some bees, received from a correspondent, which had become stupefied while searching for nectar in the flowers of *Kniphofia*. They had been unable to make their way out of the tube of the flower, and so had perished. Other bees and wasps had obtained the nectar through holes at the base of the floral tube,

and had likewise become stupefied, and had fallen to the ground, but, gradually recovering, ultimately quite revived. Mr. Massee, V.M.H., said he had frequently noticed the same thing at Kew, and had also seen the wasps eat their way out of the tube after being imprisoned, but had never observed bees doing this.

Æcidium on Abies.—Mr. Saunders showed leaves of *Abies Pinsapo* having numerous æcidia of the fungus formerly known as *Æcidium pseudo-columnare*, the white pseudo-peridia of which occur in two rows on the under surface of the affected leaves, which are somewhat paler than the healthy ones, and stand like little cups one-eighth of an inch in height. The teleutospore stage is known as *Melampsora Gæppertiana*.

Bulbils on Horseradish.—Rev. Professor Henslow showed an inflorescence of horseradish with abortive flowers, and upon which were numerous bulbils replacing the flowers.

Cleistogamous Flowers.—He also showed runners of *Viola* which had during the summer produced cleistogamous flowers only, but which were now bearing normal flowers, thus bearing out the observation he had before made that the production of cleistogamous flowers was largely due to climatal conditions.—Origin, "Floral Structures," p. 262.

"*Grit*" in Apples and Pears.—Adverting to this subject, which formed the text of a communication at the last meeting, Professor Henslow said:—"The theoretical origin of grit I would attribute to the breaking down of the 'stone' of such a fruit as that of *Cratægus*. In the formation of an 'inferior' ovary by the fusion with the ovary of a receptacular tube (calyx tube), the *interior* epidermis of the tube (as in *Prunus*) and the *exterior* one of the ovary are totally arrested; so that the central parenchymatous tissues of both are fused into one common layer, the 'pseudocarp.' In forming the fruit of the pear or apple there is no true epidermis *inside* the ovary cells; but the core consists of *two* fibrous layers confluent with the external parenchyma. If there be a stone, as in haws, this is usually described (as is also a cartilaginous core) as the endocarp. As, however, there is now no true mesocarp, and the stone is only lined with a thin fibrous layer, I would regard this latter as the homologue of the core of a pear from which the stone is gone. As this is produced by the formative tissue of the pseudocarp (which is continuous from the core to the epidermis), it might be either carpellary or axial; as 'grit' it may be found anywhere.

"Another suggestion in support of the theory arises from affinities. The tribe *Pomeæ* has nine genera; five have stone fruits, three have berries; one, *Pyrus*, has 'a cartilaginous, very rarely a crustaceous or bony endocarp' (Bentham and Hooker). Hence the stone-fruit genera form the majority and probably the ancestral condition; but the stone, or sclerenchymatous cellular tissue, being more or less arrested, has given rise to the baccate instead of a drupaceous fruit, and to a cartilaginous core. If we turn to the tribe *Poteriæ*, of the ten genera included in it at least four have an 'indurated' receptacular tube; while that of *Margyricarpus* is described as 'coriaceous or nucumentaceous'; and of *Bencomia* it is said 'the achenes are "closely invested" (arcte concreta) by the globose calyx tube into a drupe with a somewhat bony stone (putamine subosseo).' If, now, the tube of the plum should ever become

concretescent with the ovary, we should know that the stone was of a carpellary nature. But if the tube were similarly fused in *Bencomia*, we should be wrong if it were equally referred to the ovary."

Beetles in Beech.—Dr. Masters exhibited a piece of copper-beech wood much bored by beetles, together with specimens of the beetles, upon which Mr. Saunders undertook to report at the next meeting. See below, October 23.

Potato perforated by Twitch.—Dr. Masters also showed a good example of this peculiarity, which is frequently met with. Some discussion took place as to whether the perforation was due to the dissolving action of an enzyme from the tip of the twitch rhizome or merely to mechanical pressure of the growing shoot of the grass.

Galls on Salix alba.—Mr. Chittenden showed a branch of the white willow in which all the buds had become aborted and produced masses of small leaves, probably through the attacks of a mite.

Fasciation.—He also showed a specimen of *Daphne Laureola* very much fasciated, and having very small leaves, so that the whole had much the appearance of a green cockscomb.

Apples and Pears diseased.—Apples and pears attacked by *Fusicladium* were sent from Chigwell. The apple had very numerous spots just below the skin, but the cracks and roughnesses usually associated with *Fusicladium* were not apparent.

SCIENTIFIC COMMITTEE, OCTOBER 23, 1906.

Mr. G. MASSEE, F.L.S., V.M.H., in the Chair, and fourteen members present.

Beetles in Beech.—Referring to the insects in the copper beech shown at the last meeting, Mr. Saunders, F.L.S., reported:—"The insects in the decaying portion of the stem of the copper beech are specimens of a well-known beetle and its grubs. It has not, as far as I am aware, any English name. Its scientific name is *Sinodendron cylindricum*; it is very nearly allied to the well-known 'stag beetle.' I believe that it is only found in decaying wood, and not in healthy trees, and that it is not responsible for the condition of the tree, though to a certain extent it may have contributed to the rapidity of the decay. Cut away all the diseased part so as to expose the sound wood, which may be well dressed with tar."

Grit in Apples and Pears.—Rev. Professor Henslow sent the following additional note regarding this subject, which had been adverted to at the last two meetings, together with the fruit of *Pyrus japonica* and dried slices of the same:—"When the cellular tissue of the pseudocarp of *Pyrus japonica* contracts, the grit stands out conspicuously; it is thus seen to form a rather compact layer surrounding the core with ten radiating arms extending nearly to the circumference of the fruit. No grit occurs in the external part of the pseudocarp. The inference is that the original stone is still represented, but in a much reduced state, and that it is beginning to be dispersed through the pseudocarp. The

numerous ovules in two rows in each carpel are worthy of note; they are reduced to two only in apples and pears." The members of the Committee thought that much more evidence would have to be brought before it was proved that the sclerenchymatous tissue belonging to the endocarp could be diffused through an axial structure such as the flesh of the pear.

Galls on Birch.—Mr. C. H. Hooper showed galls on birch caused by the gall mite, *Eriophyes rudis*. The buds had failed to develop properly, and the trees suffered severely, sometimes dying after a short time, particularly when the attack on the tree is general. The result of a local attack is often the formation of the well-known "witches' broom." Trees locally affected often live for many years. In one case mentioned a large "witches' broom" had been known upon a tree for forty years. The mite and its galls have recently formed the subject of a memoir by Mr. Güssow. See "Naturwissensch. Zeitschrift für Land- und Forstwirtschaft," Heft 10, October 1906, pp. 421–429, 2 plates and 10 illustrations in text.

Fasciation in Ophiopogon.—A specimen of *Ophiopogon spicatus* was shown by Mr. E. M. Holmes fasciated at the apex of the inflorescence.

Fruiting of Lilium candidum.—Mr. Cuthbertson showed a plant with fully developed but unripe capsules, one of between thirty and forty, which had developed this year among about two hundred plants. The fruiting plants were just producing leaves, while those that had not fruited had produced foliage leaves several weeks ago. There had been no difference noticed among the flowers, but it was suggested that possibly the fruiting plants belonged to *Lilium peregrinum*, which differs from *L. candidum* in the narrower perianth segments.

Bi-coloured Marrow.—Miss Eddy, of Teignmouth, sent a small marrow, the upper part of which was green, the lower yellow. All the fruits on one branch of the marrow had been of this character, and on being cooked it was found that the green part tasted more like a pumpkin, being hard, and having less flavour than the marrow. The occurrence of these bi-coloured fruits is not uncommon.

Injury to Ferns.—An example of *Pteris serrulata*, one of some hundreds, was received from Chislehurst having dark-brown lines running along either side of the midrib of the pinnae. Mr. Saunders undertook to report upon them at the next meeting. See p. xci.

Wineberries dying.—Plants of wineberry dying were received from Ranceby. No fungus or insect to account for the trouble could be found, and the roots were very thick and old. It was thought the plants had probably remained in one place for too long a period.

Reputed Wild Dahlia.—Some sprays of a plant raised from seeds from America sent to Mr. Murray Thompson, secretary of the Royal Caledonian Horticultural Society, and reputed to be those of the wild dahlia, were received from Messrs. Dobbie & Co., of Rothesay, who had had it growing outdoors until October 1, when it was placed in a tub and removed under glass. The habit of the plant was that of a *Bidens*. It had attained a height of 8 feet to 9 feet, and was of a very free branching habit. The inflorescences, however, lacked ray florets, and were by no means conspicuous. The seeds produced were like those of

the dahlia in most respects, but had two small horns on each. Dr. Rendle will report upon this at the next meeting.

Diseased Fruits &c.—Several specimens of diseased apples, pears, potatoes, &c. were received and dealt with.

SCIENTIFIC COMMITTEE, NOVEMBER 6, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and twelve members present.

Mites on Ferns.—Referring to the fronds of *Pteris serrulata* sent to the last meeting, Mr. Saunders, F.L.S., reported that they were evidently attacked by the mite *Tarsonymus tepidariorum*, but he was only able to find a few cast skins. The mites had probably been killed by the fumigation or by the dipping the plants had undergone.

Reputed Wild Dahlia.—Dr. Rendle reported that the plant shown at the last meeting, raised from seed alleged to be that of the wild dahlia, was *Bidens tripartita*.

Galls on Roots of Vine &c.—Mr. G. S. Saunders showed galls on the roots of vine caused by *Phylloxera*. He also showed fruits of *Crataegus Pyracantha*, apparently affected by a fungus, which will be further examined, and a drawing of a double banana fruit. The fruit had appeared single, but when the skin was removed was seen to be double.

Malformed Flowers of Plantain.—Mr. E. M. Holmes showed spikes of *Plantago major* very much branched, and having some of the flowers converted into small foliage leaves.

Wolffia Michellii.—Mr. G. Nicholson, V.M.H., showed plants of *Wolffia Michellii* syn. *arrhiza*, a native of South-east England and other parts of Europe, the smallest of the flowering plants appearing like small grains of green sand.

Fruits of Periploca and Ficus repens.—Dr. Masters showed fruits of the shrub *Periploca græca* from Mr. Cutbush, of Highgate; and Mr. Chittenden showed fruits of *Ficus repens* from Mr. Hammond, of Wiford, Chelmsford, under whose care the plant fruits freely.

Mussel Scale on Apple.—A letter concerning this pest was received from J. B. Dowson, Esq., of Pershore, who said he had used the winter wash against it in vain in the previous year, the pest having increased enormously during the past season. It was recommended that the trunks of the trees and the thicker branches should be scrubbed with paraffin emulsion during the winter, and the trees sprayed with the same (of course of much less strength) in June of next year.

Acorns of Quercus rubra.—Mr. C. Parrott, of Springfield Park, Clapton, sent ripe acorns of *Quercus rubra* to show that this oak perfects its fruit in this country. This oak, like *Q. coccinea*, perfects its fruit in the second year after flowering, and both perfect and partially developed fruits are to be found upon the same tree.

Botanical Certificate.—An inflorescence of the orchid *Bonatea Uganda*, Rolfe, was shown by Mr. Brown, of Haverfield Gardens, Kew.

This new plant was introduced by Mr. E. Brown from Uganda, East Africa, about two years ago, when he sent living tubers to Kew. It eventually flowered, and proved to be a new species, and was named

B. Ugandæ by Mr. R. A. Rolfe. At first sight it reminds one of *Habenaria*, with its long spurs and peculiarly shaped flower.

The colour is light green except upon the column, which is white; and Mr. Brown tells us that practically the whole flower is pure white in its native habitat. It was found growing with plants such as one usually assigns to the cactus house, and probably the plants in this country have been grown under too moist conditions, which may cause a slight variation in colour. Until recently the genus *Bonatea* was only represented by *B. speciosa*, a native of South Africa. It is not often seen in flower, and has the reputation of being a bad grower; but *B. Ugandæ* promises to be a stronger plant. At present it is exceedingly rare: the only living specimens known in this country are two plants in the rich collection at Kew, and a few tubers that are in the possession of Mr. Brown.

On the motion of Mr. C. T. Druery, seconded by Mr. Bennett-Poë, it was unanimously awarded a Botanical Certificate.

Plant Diseases.—Specimens of diseased violets from Exeter and Northwich, and celery from Colyton, were received, and will be reported upon at the next meeting.

SCIENTIFIC COMMITTEE, NOVEMBER 20, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and fifteen members present.

Spotting in Apples.—Mr. Güssow said:—"The apples brought before the Committee on October 23 by Mr. Worsley showed externally a number of depressed spots. When cut, discolorations of the tissues corresponding with the external pits were noticeable; also a number of brownish spots distributed all over the cut surface. To the naked eye the appearance of the spots was spongy. The taste of the apple was distinctly bitter. This injury renders the sale of the apples impossible. The cause of the spots finds an explanation as follows: The injury is most prevalent in dry seasons, and confines itself generally to fruits with softish flesh. Those of a firm, hard flesh rarely show these spots. When in dry seasons the flow of organic materials necessary for the full development of the fruits is interrupted, several groups of cells will remain poor in reserve food, and much sooner become exhausted. This exhaustion manifests itself by a brownish discoloration of the tissues. The beginning of this injury evidently takes place in the early stages of the developing fruit. One generally finds the cell tissues, when viewing them under the microscope, of a corky nature, and filled with small colonies of starch granules, whilst in the healthy tissues the starch has been already transformed into sugar. The brown tissues are frequently torn. The explanation of this is simple. During the growth the normal tissues only develop, and when normally expanding, the injured cells, which on account of their dry and corky cell walls have become inflexible, are torn. The manifestation of life is stopped in these cells, and the change of the starch granules into sugar cannot take place. The remedy for this injury is a supply of water, to be repeated at intervals during the dry season. It has been found that when nitrogenous manure had been applied the apples showed more signs of injury

than without manure." Mr. G. Massee has also shown experimentally that the same kind of trouble may be caused by certain conditions working together during the ripening process. (See "Kew Bulletin," August 1906.) The trouble is due to a purely physiological cause, and is not induced by the attacks of either fungal or insect parasites.

Diseased Celery.—Mr. Chittenden reported that the celery from Colyton shown at the last meeting was attacked by the fungus *Septoria Petroselinii* var. *Apii*, and the attack seemed to be a very bad one. The whole of the leaf, blade, and petiole was covered with the brown spots which show where the fungus was growing, and upon each of these little black spots the perithecia of the fungus were abundant. Each perithecium contained large numbers of spores which were set free on wetting the leaf, and would easily be washed on to other leaves, where they would set up the disease afresh. All the diseased parts of the plants should be destroyed by burning, and a celery crop should not be taken off the same soil next year. Spraying the plants at intervals of about a fortnight with ammoniacal solution of copper carbonate would probably prevent the recurrence of the disease in a succeeding year.

Diseased Violets.—Mr. Chittenden also reported that he had found the fungus *Ascochyta Violæ* upon the violets shown at the last meeting. This fungus is becoming more and more prevalent upon violets, and the only plan when the disease has once gained a secure footing seems to be to burn the stock and start afresh on fresh soil.

Fruits of Magnolia.—Mr. W. H. Divers sent fruits with ripe seeds of *Magnolia Lennei* from the gardens, Belvoir Castle, Grantham. The seeds, which are of a bright pink colour and half as large as the seeds of French beans, are set free by the bursting of the follicles, and hang for some time attached by the long slender funicle.

Fruit of Gomphocarpus fruticosus syn. *Asclepias fruticosa*.—Dr. Masters showed on behalf of Mr. Hales, of the Chelsea Physic Garden, the fruits of this interesting asclepiad. The fruits are large bladder-looking pods of a white colour, and contain numbers of brown seeds, each furnished with a tuft of silky-white hairs at the apex.

Maize Varieties.—Mr. S. B. Dicks, F.R.H.S., sent specimens of varieties of maize grown in the gardens of Mr. C. L. Allen, of Long Island, U.S.A., as follows :—

1. A cob of the primitive (?) form, in which the grains are each covered with bracts about an inch to an inch and a half long.

2. A cob of golden pop-corn.

3. A cob found on a plant of golden pop-corn, but having black grains instead of the usual light-coloured ones ; a variation not at all infrequent in *Zea Mays*.

4. Two cobs from a plant, the result of a natural hybridisation between the (Egyptian ?) primitive form with long bracts and the golden pop-corn. Although these were picked from the same plant, there was considerable variation in the length of the bracts to be seen, one cob having the grains entirely hidden, while in another they were exposed.

Narcissus viridiflorus.—Messrs. Barr showed this interesting species of *Narcissus* wild in Morocco and Gibraltar, in flower, having a tall scape surmounted by two flowers having green segments.

Autumn-flowering Snowdrop.—Mr. E. A. Bowles, F.L.S., showed a specimen of snowdrop, one of many now in flower in his garden. It was, apparently, a variety of *Galanthus plicatus*, and it was thought had not previously been seen to flower in autumn in this country.

Bonatea Ugandæ (Rolfe).—This orchid, to which at the last meeting a Botanical Certificate was recommended, was commented upon by Dr. Masters, who drew attention to the remarkable form and size of the rostellum, the length of the caulicles of the pollinia which fitted into long tubes at the sides of the rostellum, and the length of the spur, which reached to between five and six inches.

Uncommon Orchids.—A species of *Pleurothallis* from R. I. Measures, Esq., and *Oncidium Waluewa* (Rolfe), from H. T. Pitt, Esq., of Stamford Hill, were shown at this meeting, and will be further reported upon at the next meeting.

Cattleya Fly.—Mr. Bowles showed pseudo-bulbs of newly imported Cattleyas, which were badly infested with the larvæ of the Cattleya fly, *Isosoma* sp., a pest too well known on Cattleyas. Mr. Bennett-Poë suggested that the only way of dealing with the trouble is to collect the affected pseudo-bulbs, which turn black, and burn them.

Change of Food by Birds.—Mr. Hooper said he had recently met with some remarkable changes in the habits of birds so far as their food was concerned. He had heard from Cornwall of some tomatoes being attacked by blackbirds, but could not hear of tomatoes being injured by any other birds. Again, at Blairgowrie, rooks had been discovered eating raspberries. Mr. Hooper is collecting information regarding the food of particular birds that frequent fruit-gardens, and will be glad to receive accounts of any exact observations made upon the subject.

With reference to this matter Mr. A. C. Bartlett, Pencarrow Gardens, Cornwall, writes :—"During the past autumn I frequently saw a cock-black-bird (or birds) voraciously feasting on ripe tomatoes which were growing against a south wall in front of my house. Tomatoes were plentiful, and, being interested, I took no steps to stop it; but as the weather turned colder, I had some spare lights placed against the wall to assist in ripening the fruits. There was a space of about four inches between each light, and taking advantage of this the bird continued his feast. I feel sure the hen birds did not participate; and, judging from the quantity eaten, I should say that probably two birds were so engaged, though I never saw more than one at a time."

Sempervivum dying.—Mr. O'Brien, V.M.H., sent a specimen of *Sempervivum* dead and dried up, one of several that had been affected by some disease. Mr. Saunders will report upon it at the next meeting.

SCIENTIFIC COMMITTEE, DECEMBER 11, 1906.

Dr. M. T. MASTERS, F.R.S., in the Chair, and eleven members present.

Dying Sempervivum.—Mr. Saunders, F.L.S., reported that he could find no reason for the death of the *Sempervivum* shown at the last meeting from Mr. O'Brien. "There were no signs of injury to the

leaves by insects, nor did I notice any on the roots. I could see no trace of fungi. Is it not possible that the plants had been kept too damp?"

Cattleya Fly.—Mr. Saunders also reported that "the shoots of the orchids shown by Mr. Bowles were undoubtedly infested by the so-called 'Cattleya fly' (*Isosoma orchidcarum*). It is not, however, a fly, but a hymenopterous insect belonging to the family *Chalcididae*, the members of which are parasitic on other insects as a rule. The genus *Isosoma* is placed in the sub-family *Eurytomidae*, several members of which are found in almost gall-like swellings in the stems and shoots of various plants. I believe that it is still an open question whether these insects are the cause of the swellings, or whether they are parasitic on others which have formed them. This should not be a difficult question to answer if one had sufficient material to work upon, as the parasitic grub ought to be found at some time of its existence devouring the maker of the gall. Considering that the *Chalcididae* are nearly allied to the *Cynipidae*, who are undoubtedly gall-makers, I am inclined to think that *Isosoma* is the real cause of the injury to orchids. I cannot recommend any remedy but the very obvious one of burning, or in some other way destroying the infested shoots. The present would appear to be a very good time for doing this, as most of the insects are in the pupal state, just ready to emerge."

Oncidium Waluewa, Rolfe.—Dr. Masters reported that he had examined this species, referred to him at the last meeting. It was not a new plant, and he could find nothing in its structure to entitle it to a botanical certificate. The committee concurred with this view. The following synonyms and references were quoted: *Leiochilus pulchellus*, Coigneaux, "Fl. Brasil," orchid x., p. 450, tab. xciv., fig. 11. *Waluewa pulchella*, Regel, "Garten-Flora," xl., 1889, f. 1341; O'Brien in "Gard. Chron." 1901, xxx. p. 365.

Root-formation in Apples.—Mr. Spencer Pickering, F.R.S., showed roots of Apples on Paradise Stock, which had been grown in sand, and were remarkable for the extraordinarily numerous root fibres, some of which were thickened and of a very light colour. He also showed photographs of trees of the same age, and otherwise treated in the same way, but grown in a clay soil, where there was much less development of roots. In those grown in sand, however, the shoots formed were very short, while in those grown in clay they were much more vigorous. In reply to questions he stated that the addition of nutrient salts had had no appreciable effect upon the extent of the root system, nor upon the growth of the branches. The roots were not only of a peculiarly light colour, but were also very soft, the cortical tissue in some being greatly developed; no investigations as to the number &c. of the root hairs had been made. It was suggested that the structure of the roots was due to the mechanical condition of the soil, and others suggested that the presence or absence of certain species of bacteria that possibly have considerable influence upon the proper action of roots might have caused the remarkable differences noted, but it was clear that much more experiment was needed before a full reason for the observed differences could be assigned.

Sweet Williams diseased.—Mr. Chittenden reported that since the last meeting he had received and examined Sweet Williams from Cobham, Surrey, badly attacked by the fungus *Puccinia Arenariæ*. This fungus is exceedingly destructive to these plants, and apparently spreads to them from such weeds as the Chickweeds and Stitchworts, which are very frequently attacked by it. Affected plants are best removed and burned, as they never recover.

Effect of Environment on Plants.—Mr. Saunders, F.L.S., showed a very dwarf specimen of the thorn apple, *Datura Stramonium*, about 4 in. in height, bearing at its apex a single small fruit. The plant had been growing in a hedge.

Fungus on Chestnut.—Mr. Worsdell showed a piece of the bark of Horse Chestnut bearing the small bright warts typical of the presence of the fungus *Nectria cinnabarina*, so common upon dead wood, but also spreading from dead wood to the living tissues of plants.

Malformed Orchids.—Dr. Masters submitted a specimen on behalf of Mr. Macbean of *Odontoglossum crispum*, in which all the parts of the column which are usually confluent were developed, in the form of free petals, resulting in the formation of a double flower. Mr. Bennett-Poë showed a specimen of *Cypripedium* in which the dorsal sepal was doubled. Dr. Masters undertook to report upon this at the next meeting.

Hybrid Orchid.—Mr. Douglas, V.M.H., showed flowers of a hybrid orchid raised from seed of *Lalia harpophylla* crossed with pollen of *L. purpurata*, the only sign of the latter in the colour being a small purple spot near the end of the *labellum*. Dr. Masters undertook to report upon it further at the next meeting.

Gooseberry Mildew (Spherotheca mors-Urvæ).—A specimen of the American gooseberry mildew from Worcestershire was shown by Mr. Güssow. The specimen showed an abundance of the mildew and its typical perithecia upon the younger parts of the branches. Mr. Hooper said the disease did such great damage in Canada and in parts of the United States, that the European gooseberry could not be grown there with any prospect of a crop, and its cultivation had been practically abandoned in America. He brought forward the following resolution concerning the disease:—"That it is most desirable that the Board of Agriculture should take immediate steps to promptly submit all evidence obtainable on the matter of the American gooseberry mildew to a small skilled committee, for a decision at once as to the danger of the disease spreading, and other important factors in the matter." The resolution, however, was not seconded, and therefore fell to the ground. Mr. Massee, V.M.H., remarked that he had visited the Evesham district, and had found the mildew on gooseberries in three distinct places, and in one where the bushes had been growing in a damp and sheltered place the grower said, when it was pointed out to him, that he had known the disease for the past thirty years, and he had not imported any Continental or Irish-grown gooseberries for that period. He thought it quite possible that the disease had existed in the country for a considerable time, and that since the spores were so minute it was quite likely that they would be carried for a great distance by the wind or with merchandise of various

kinds, although the importation of the plants from Ireland and the Continent should be prohibited. Other members concurred, and it was pointed out that the fungi found in a certain country frequently attacked newly imported plants with increased vigour, rendering their cultivation practically impossible ; this had apparently been the case with this fungus in Canada. It was pointed out by Mr. Güssow that in a certain year in Germany the cherries were very badly affected by the disease, due to *Monilia fructigena* ; but this disease had not appeared to an injurious extent in succeeding years upon the cherry, thus showing that a number of circumstances, acting together, frequently affected the prevalence or otherwise of any fungoid attack.

FLORAL COMMITTEE.

JANUARY 9, 1906.

Mr. W. MARSHALL in the Chair, and twenty-nine members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To H. Buckston, Esq., Sutton Hall, Etwall, for a group of magnificent Cyclamens.

Silver-gilt Banksian Medal.

To Mr. Drost, Richmond, for Hippeastrums, Lilacs, and Azaleas.

Silver Flora Medal.

To Mr. H. B. May, Edmonton, for Ferns.

To Mr. S. Mortimer, Farnham, for Carnations.

To Messrs. W. Paul, Waltham Cross, for Camellias.

To Messrs. J. Veitch, Chelsea, for Coleus, Jacobinias, &c.

To Leopold de Rothschild, Esq., Gunnersbury Park, W. (gr. Mr. Reynolds), for *Jasminum primulinum*.

Silver Banksian Medal.

To Sir Edmund Loder, Bart., Leonardslee, Horsham (gr. Mr. Cook), for *Sarracenia purpurea*.

To Lord Aldenham, Elstree (gr. Mr. Beckett), for winter-flowering plants.

Bronze Flora Medal.

To Messrs. Low, Bush Hill Park, for Cyclamens and Carnations.

Bronze Banksian Medal.

To Messrs. Peed, Streatham, for alpine plants.

To Messrs. Ware, Feltham, for Primulas and Carnations.

Cultural Commendation.

To Mr. W. A. Cook, gr. to Sir Edmund Loder, Bart., Leonardslee, for *Sarracenia purpurea*.

Other Exhibits.

Messrs. Cannell, Swanley, staged a group of Primulas.

Miss Hopkins, Knutsford, brought hardy flowers.

Mr. L. R. Russell, Richmond, sent hardy shrubs.

Messrs. Waterer, Bagshot, brought Conifers.

H. G. Elwes, Esq., Colesbourne, Glos., sent *Massonia pustulata* and *Veltheimia glauca*.

Mr. E. Judson, Hull, sent Chrysanthemum 'Mrs. C. Jennings.'

FLORAL COMMITTEE, JANUARY 23, 1906.

Mr. W. MARSHALL in the Chair, and twenty-two members present.

Awards Recommended:—

Silver-gilt Flora Medal.

- To Mr. H. B. May, Edmonton, for *Davallias*.
- To Mr. W. Seward, Hanwell, for *Cyclamens*.

Silver Flora Medal.

- To Messrs. Cannell, Swanley, for *Primulas*.

Silver Banksian Medal.

- To Messrs. Cutbush, Highgate, for bulbous and alpine plants.
- Mr. A. F. Dutton, Iver, Bucks, for *Carnations*.
- To Mr. J. E. Lowe, Hatton, Warwick, for *Chrysanthemum* 'Winter Cheer.'

- To Mr. G. Reuthe, Keston, for alpine plants.
- To Messrs. J. Veitch, Chelsea, for winter-flowering plants.
- To Messrs. J. Waterer, Bagshot, for *Conifers*.

Bronze Banksian Medal.

- To Messrs. Peed, Streatham, for alpine plants.
- To Messrs. Ware, Feltham, for *Primulas*, *Carnations*, &c.

First-class Certificate.

To *Buddleia asiatica* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A very handsome sweet-scented variety from the Himalayas, and supposed to be not quite hardy, and therefore requiring cool greenhouse treatment. The flower spikes are about 6 to 8 inches long, greenish-white, very fragrant, and borne profusely on quite small plants; growth rather slender, with lanceolate leaves.

Other Exhibits.

Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. Hudson, V.M.H.), sent *Hæmanthus magnificus*.

Sir J. W. Ramsden, Bart., Ferrybridge (gr. Mr. Taylor), sent a hybrid *Camellia*.

- T. H. Chapman, Esq., Guldeford Lodge, Rye, staged *Freesias*.
- Messrs. Barr, Covent Garden, brought spring flowers.
- Miss Hopkins, Knutsford, sent spring flowers.
- Messrs. Low, Bush Hill Park, staged *Cyclamens* and *Carnations*.
- Messrs. Bull, Chelsea, sent stove plants.
- Mr. S. Mortimer, Farnham, brought *Carnations*.

FLORAL COMMITTEE, FEBRUARY 13, 1906.

Mr. W. MARSHALL in the Chair, and twenty-seven members present.

Awards Recommended:

Gold Medal.

- To Mr. C. Englemann, Saffron Walden, for *Carnations*.

Silver-gilt Flora Medal.

To Messrs. Cuthbert, Southgate, for forced shrubs.

To Messrs. W. Paul, Waltham Cross, for Camellias.

To Mr. A. F. Dutton, Iver, for Carnations.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and alpine plants.

To Lady Tate, Park Hill, Streatham (gr. Mr. Howe), for Tulips and Narcissus.

To Messrs. Sutton, Reading, for Primulas and Cyclamens.

To Messrs. Cannell, Swanley, for Primulas.

Silver Flora Medal.

To Mr. H. Burnett, Forest Road, Guernsey, for Carnations.

To Messrs. Hill, Edmonton, for Ferns.

To Messrs. Ware, Feltham, for Carnations and alpine plants.

To Mr. S. Mortimer, Farnham, for Carnations.

Silver Banksian Medal.

To Messrs. Low, Bush Hill Park, for Carnations and Cyclamens.

To Messrs. Dodd and Lancashire, Guernsey, for Carnations.

Bronze Flora Medal.

To Mr. H. B. May, Edmonton, for miscellaneous plants.

To Mr. G. Reuthe, Keston, Kent, for alpine and bulbous plants.

To Mr. L. R. Russell, Richmond, for forced shrubs.

To Messrs. J. Veitch, Chelsea, for winter-flowering plants.

Bronze Banksian Medal.

To Mr. Hayward Mathias, Thames Ditton, for Carnations.

Award of Merit.

To *Lachenalia* 'Brightness' (votes, 11 for, 2 against), from Mr. F. W. Moore, Botanic Gardens, Glasnevin. A variety of exceptionally strong habit, with large deep yellow flowers margined with bright crimson.

To *Asparagus Colmanii* (votes, 14 for, 1 against), from Jeremiah Colman, Esq., Gatton Park, Reigate (gr. Mr. Bound). This may be described as a dwarf elegant form of *A. Sprengeri*, and is most useful for decorative purposes.

To Carnation 'Mrs. H. Burnett' (votes, unanimous), from Mr. H. Burnett, Forest Road, Guernsey. A lovely variety of winter-flowering Carnations; the flowers are of moderate size, perfect form, with substantial petals, slightly serrated and of a beautiful shade of rosy-salmon, and possessing a nice scent.

Other Exhibits.

Messrs. Paul, Cheshunt, staged Roses and Lilacs.

Messrs. Peed, Streatham, brought alpine plants.

Messrs. Waterer, Bagshot, sent Hollies.

Mr. W. Palmer, Andover, sent Primula 'Queen Alexandra.'

Mr. Upton, Millmead, Guildford, staged hardy plants.

Messrs. Bull, Chelsea, brought miscellaneous plants.

Messrs. Williams, Upper Holloway, brought forced shrubs.

Messrs. Barr, Covent Garden, brought hardy flowers.

Mr. J. Box, West Wickham, sent Begonias.

Messrs. Wallace, Colchester, staged alpine plants.

Miss Hopkins, Mere, Knutsford, sent spring flowers.

Sir E. G. Loder, Bart., Leonardslee, Horsham (gr. Mr. Cook), sent flowering trees and shrubs.

Lady Chesterfield, Holme Lacy, Hereford (gr. Mr. Humphries), sent very fine Violets.

FLORAL COMMITTEE, MARCH 6, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and thirty members present.

Awards Recommended :—

Gold Medal.

To Messrs. Cutbush, Highgate, for forced shrubs and alpine plants.

Silver-gilt Flora Medal.

To Alfred de Rothschild, Esq., Halton, Tring (gr. Mr. Sanders), for Hippeastrums.

To Mr. J. May, Twickenham, for Cyclamens.

To Messrs. Cuthbert, Southgate, for Hyacinths.

Silver-gilt Banksian Medal.

To Messrs. Cripps, Tunbridge Wells, for Japanese Acers.

To Messrs. Hill, Edmonton, for Ferns.

To Mr. L. R. Russell, Richmond, for forced shrubs.

To Mr. Dutton, Iver, for Carnations.

Silver Flora Medal.

To Messrs. Sutton, Reading, for Cinerarias.

To Mr. Reuthe, Keston, Kent, for Alpine and bulbous plants.

To Mr. H. B. May, Edmonton, for Clematis &c.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for spring flowers.

To Messrs. Cannell, Swanley, for Cinerarias and Pelargoniums.

To Messrs. Jackman, Woking, for alpine plants.

To Messrs. Paul, Waltham Cross, for double-flowered Peaches and Almonds.

To Messrs. J. Veitch, Chelsea, for miscellaneous flowering plants.

Bronze Flora Medal.

To Messrs. Ware, Feltham, for hardy flowers.

Award of Merit.

To Carnation 'Elliott's Queen' (votes, 19 for, 8 against), from Mr. H. Elliott, Hassocks, Sussex. A tree variety with rather large flowers, fragrant, and non-splitting calyx; the colour is a beautiful soft rose and the petals large and slightly serrated.

To Carnation 'Nelson Fisher' (votes, unanimous), from Mr. Dutton, Iver. A tree variety of American origin with very large flowers, of good form, large petals with fringed edges, and a deep cerise colour, with a distinct clove scent.

To *Freesia Tubergeni* (votes, unanimous), from Mr. C. G. van Tubergen, Jun., Haarlem, Holland. An exceptionally large variety with flowers of a violet colour, shading to nearly white in the throat. Raised from *F. refracta alba* × *F. Armstrongi*.

To *Polypodium phymatodes corymbosum* (votes, 16 for, 1 against), from Mr. H. B. May, Edmonton. A pretty and distinct form of *P. phymatodes*, with charming crested fronds.

To *Davallia canariensis elegans* (votes, unanimous), from Messrs. Hill, Edmonton. A new variety imported from the Canary Islands. The stems are similar to those of *D. canariensis*, and the fronds very finely cut, like *D. fijiensis elegans*. A very beautiful and graceful variety.

Other Exhibits.

Messrs. Bull, Chelsea, staged Palms &c.

Messrs. Cheal, Crawley, brought spring flowers.

Messrs. Clark, Dover, staged Primroses and rock plants.

Mr. A. R. Upton, Guildford, sent hardy plants.

Miss Hopkins, Knutsford, brought hardy plants.

Messrs. Low, Bush Hill Park, staged Carnations, Cyclamens, &c.

Mr. G. Mount, Canterbury, sent Roses.

Messrs. Peed, Streatham, staged alpine plants.

Mr. M. Prichard, Christchurch, sent new rock plants.

Messrs. Williams, Upper Holloway, brought forced shrubs &c.

Messrs. Manger, Guernsey, sent Narcissus 'Souvenir.'

Messrs. R. Veitch, Exeter, brought *Prunus Saxifraga*, and *Ericas*.

Messrs. Treseder, Truro, sent several varieties of *Eucalyptus*.

Mr. W. A. Cull, Edmonton, brought *Pteris Wimsettii* 'Distinction.'

J. T. Bennett-Poë, Esq., Holmwood, Cheshunt (gr. Mr. Downes), staged *Lachenalia* 'Emmaline Crocker.'

Messrs. Paul, Cheshunt, brought Lilac 'Belle de Nancy,' which the Committee asked to see again from the open ground.

FLORAL COMMITTEE, MARCH 20, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and thirty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To E. A. Hambro, Esq., Hayes Place, Kent (gr. Mr. Grandfield), for hardy flowers.

To Messrs. Cuthbert, Southgate, for forced shrubs.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Magnolias and alpine plants.

To Messrs. Low, Bush Hill Park, for Acacias, Carnations, and Roses.

Silver Flora Medal.

To Lord Aldenham, Aldenham House, Elstree (gr. Mr. Beckett), for *Thyrsacanthus rutilans* and Willows.

To Messrs. Cannell, Swanley, for Pelargoniums and Cinerarias.

To Mr. L. R. Russell, Richmond, for forced shrubs and Clematisses.

To Cape of Good Hope Government, 100 Victoria Street, S.W., for *Ericas* &c.

To C. E. Pillans, Esq., Agricultural Department, Cape Colony, for succulent plants.

Silver Banksian Medal.

To Mr. H. B. May, Edmonton, for miscellaneous flowering plants.

To Mr. G. Reuthe, Keston, Kent, for rock and bulbous plants.

To Messrs. J. Veitch, Chelsea, for miscellaneous greenhouse plants.

To Mrs. Robinson, Simon's Town, Cape Colony, for paintings of the Cape flora.

Bronze Flora Medal.

To Messrs. Paul, Waltham Cross, for Banksian Roses.

To Messrs. Ware, Feltham, for spring flowering plants.

Award of Merit.

To Rose 'Climbing Frau Karl Druschki' (votes, 19 for), from Messrs. Laurenson, Egglescliffe, Yarm-on-Sea. This is a climbing form of the popular 'Frau Karl Druschki,' with flowers of the same shape and colour. As the plant exhibited was covered with blooms, and appeared very vigorous, it should prove a valuable addition to our climbing Roses.

To Carnation 'Britannia' (votes, unanimous), from Mr. A. Smith, Enfield Highway. A tree variety with large flowers of excellent form, perfect calyx, a brilliant red colour, and slightly scented. A strong grower.

To Polyantha Rose 'Princess Ena' (votes, unanimous), from Mr. H. B. May, Edmonton. A charming sport from 'Madame Levvasseur.' The flowers are a deep rose-pink shading to a white centre, with yellow stamens. The plants were about 18 inches high, each shoot carrying a large spray of blooms, and each flower being about two inches across.

Other Exhibits.

Mr. W. E. Boyes, Leicester, brought Carnations.

Messrs. Cheal, Crawley, staged alpine plants.

Messrs. Cripps, Tunbridge Wells, put up a large group of Japanese *Acers*.

Messrs. Gilbert, Bourne, sent *Anemones*.

Messrs. Jarman, Chard, brought *Cinerarias*.

Messrs. Peed, West Norwood, sent alpine plants.

Mr. S. Mortimer, Farnham, staged Carnations and Stocks.

Mr. H. C. Pulham, Elsenham, brought alpine plants.

Mr. A. R. Upton, Millmead, Guildford, brought rock plants.

Miss Williams, Tredrea, Cornwall, sent *Anemone fulgens*.

Messrs. Wallace, Colchester, brought alpine plants.

Mrs. Powys-Rogers, Berncoose, Perranwell, sent Blue Primroses.

Messrs. R. Smith, Worcester, staged Anemones.

The King's Acre Nursery Co., Hereford, staged Clematis 'King's Acre Fairy.'

Messrs. Linden, Brussels, sent *Hæmanthus mirabilis grandiflora*.

Royal Botanic Gardens, Glasnevin, sent Rhododendron 'Mars.'

Mr. H. Elliott, Hassocks, brought Carnations.

Rev. W. H. Oxley, Petersham Vicarage, sent *Trachystemon orientale*, from the open garden.

FLORAL COMMITTEE, APRIL 3, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and seventeen members present.

Awards Recommended :—

Gold Medal.

To Mr. G. Mount, Canterbury, for Roses.

Silver-gilt Flora Medal.

To Mr. A. F. Dutton, Iver, for Carnations.

Silver Flora Medal.

To Mr. H. B. May, Edmonton, for Roses &c.

To Messrs. Cannell, Swanley, for Pelargoniums.

To Messrs. Cutbush, Highgate, for alpine and hardy flowers.

To Mr. L. R. Russell, Richmond, for Clematises.

Silver Banksian Medal.

To Messrs. F. Cant, Colchester, for Roses.

To Messrs. Garraway, Bristol, for Schizanthuses.

To Messrs. Low, Enfield, for Roses, Carnations, and Acacias.

To Messrs. J. Veitch, Chelsea, for miscellaneous plants.

Award of Merit.

To Rhododendron 'White Pearl' (votes, 9 for, 3 against), from Messrs. Cutbush, Highgate. This may be described as a pure white form of the now well-known 'Pink Pearl,' and is exactly similar in form of flower and foliage. A perfectly charming variety.

To Hippeastrum 'Marjory' (votes, unanimous), from Major Holford, C.I.E., Westonbirt, Tetbury. Flowers very large, excellent shape, and a brilliant crimson colour with white veins.

To Hippeastrum 'Field Marshal' (votes, unanimous), from Major Holford, C.I.E. A magnificent scarlet self flower without a trace of green or other colour, of the largest size, and perfect form.

To Hippeastrum 'Pearl Maiden' (votes, unanimous), from Major Holford, C.I.E. A beautifully formed flower of medium size and of a deep scarlet colour, veined and marked with white. A very distinct variety.

To Hippeastrum 'Brian Boru' (votes, unanimous), from Major Holford, C.I.E. Flower of the largest size, perfect, and of an intense dark crimson colour.

To *Hippeastrum* 'Agamemnon' (votes, 12 for), from Major Holford, C.I.E. Flowers of medium size, fine shape, and of a deep scarlet colour, veined and ribbed with white.



FIG. 53.—HIPPEASTRUM 'MARJORY.' (*The Garden.*)

To *Thunbergia mysorensis* (votes, unanimous), from C. Butler, Esq., Warren Wood, Hatfield. This lovely old but rare plant is also known as *Hexacentris mysorensis*, and is one of the most beautiful and curious of stove climbing plants. The racemes are long, pendent, with flowers

1½ inches long and about 2 inches across the mouth, of a very deep orange and pale yellow colour. Although the flowers are of little value in a cut state, they have a charming effect on the roof of a stove all winter.

To *Cycas Micholitzii* (votes, 10 for), from Messrs. Sander, St. Albans. A very graceful and distinct Cycad that will prove valuable as a decorative plant.

Other Exhibits.

Messrs. Gilbert, Bourne, staged anemones.

Mr. A. R. Upton, Guildford, sent rock plants.

Messrs. W. Paul, Waltham Cross, brought Rose 'Warrior.'

Messrs. S. Paul, Cheshunt, staged flowering shrubs.

Messrs. Peed, Streatham, sent alpine plants.

Messrs. Waterer, Bagshot, brought Rhododendrons.

Mrs. G. F. Wilson, Heatherbank, Weybridge, sent Blue Primroses.

Mrs. W. H. Burns, North Mymms Park, Hatfield (gr. Mr. Fielder), sent some beautiful seedling Hippeastrums, including a pure white one, and others almost pure white.

Mr. G. Riley, Oakfield, Walton-on-Thames, sent a curious Calceolaria in which the flowers had sported two distinct colours on the same plant. It was referred to the Scientific Committee.

Mr. Milcham, Leatherhead, brought Hippeastrum 'Arthur T. Miller.'

From the State Botanic Garden, Brussels, came two new plants from the Congo, viz. *Ficus Dryepondtiana* and *Sansevieria Laurentii*, which the Committee asked to see again.

Mr. T. S. Timmis, Cleveley, Allerton, sent large blooms of *Lapageria*.

Messrs. Cuthbert, Southgate, staged *Magnolia cordata*

FLORAL COMMITTEE, APRIL 17, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-one members present.

Awards Recommended:—

Gold Medal.

To Major Holford, C.I.E., C.V.O., Westonbirt, Tetbury (gr. Mr. Chapman), for a superb collection of Hippeastrums.

To Messrs. Cutbush, Highgate, for a wonderful display of hardy plants.

Silver-gilt Flora Medal.

To Mrs. W. H. Burns, North Mymms Park, Hatfield (gr. Mr. Fielder), for a unique group of white-flowered Hippeastrums.

To Messrs. Cuthbert, Southgate, for forced shrubs.

Silver-gilt Banksian Medal.

To Leopold de Rothschild, Esq., Ascott, Leighton Buzzard (gr. Mr. Jennings), for Malmaison Carnations.

Silver Flora Medal.

- To Messrs. Dobbie, Rothesay, for Anemones, Pansies, and Violas.
- To Mr. H. B. May, Edmonton, for miscellaneous flowering plants.
- To Mr. S. Mortimer, Farnham, for Carnations and Polyanthuses.
- To Mr. L. R. Russell, Richmond, for Clematises.

Silver Banksian Medal.

- To Sir F. T. Barry, Bart., St. Leonard's Hill, Windsor (gr. Mr. Brown), for Camellias grown outside.
- To Messrs. Cannell, Swanley, for Pelargoniums.
- To Mr. Lewis, Bridgwater, for Anemones.
- To Messrs. J. Veitch, Chelsea, for miscellaneous plants.

Bronze Flora Medal.

- To Messrs. Smith, Worcester, for Clematises &c.
- To Miss Hopkins, Knutsford, for hardy plants.

Award of Merit.

To *Mertensia primuloides* (votes, 10 for, 5 against), from Messrs. Cutbush, Highgate. A charming dwarf plant with clusters of deep purplish-blue flowers, with a distinct clear white eye. If hardy, as it is said to be, it should prove a valuable rock plant.

To *Caltha polypetal*a (votes, 15 for, 2 against), from Messrs. Wallace, Colchester, and Sir Edmund Loder, Leonardslee. A remarkably fine form of the *Caltha* with flowers three inches across, single, and of the usual buttercup-yellow colour; foliage much larger than the type. A very fine sub-aquatic plant.

To *Rhododendron* 'Gill's Triumph' (votes, 9 for, 4 against), from Mr. R. Gill, Penryn, Cornwall. A splendid variety raised from *R. Aucklandii* × *R. Thomsonii*. The heads of flowers are of great size and a brilliant crimson-red colour.

To *Saxifraga oppositifolia* var. *coccinea* (votes, unanimous), from Messrs. Backhouse, York. The foliage, growth, and size of blossom are exactly the same as *S. oppositifolia*, but the colour of the flower is deep purplish-red. This will prove an acquisition to the alpine garden.

Other Exhibits.

- Messrs. Bull, Chelsea, staged miscellaneous plants.
- Messrs. Cheal, Crawley, brought rock plants &c.
- Sir E. Loder, Bart., Leonardslee (gr. Mr. Cook), sent *Rhododendrons* &c.
- The Hon. Justice Swinfen Eady, Weybridge (gr. Mr. Lock), sent *Clarkias*.
- Messrs. Low, Bush Hill Park, staged Carnations.
- Messrs. Paul, Cheshunt, brought shrubs and Roses.
- Messrs. Peed, Streatham, put up alpine plants.
- Messrs. Perry, Winchmore Hill, sent hardy flowers.
- Messrs. Pulham, Elsenham, brought rock plants.
- Mr. A. R. Upton, Guildford, staged hardy plants.
- F. D. Godman, Esq., Horsham (gr. Mr. Moody), sent *Rhododendrons*.
- Messrs. Wallace, Colchester, put up hardy flowers.

Norman C. Cookson, Esq., Wylam-on-Tyne, sent *Hippe-Vallota Oakwoodiensis*.

Mr. J. Douglas, V.M.H., Great Bookham, brought Auriculas.

G. Ferguson, Esq., Weybridge, staged *Mimulus luteus cupreus* 'Dorothy.'

T. Leslie, Esq., Trinity Cottage, Edinburgh, sent *Rhododendron* 'McHattiana.'

Lady Alice Dundas, 14 Albemarle Street, W., sent Carnations.

Messrs. Turner, Slough, brought *Ochna multiflora*.

FLORAL COMMITTEE, MAY 1, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-four members present.

Awards Recommended :—

Gold Medal.

To Mr. J. Douglas, V.M.H., Edenside, Great Bookham, for a wonderful exhibit of show and alpine Auriculas.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Phyllocactus, Roses, and Pelargoniums.

To Mr. A. F. Dutton, Bexley Heath, for Carnations.

To E. A. Hambro, Esq., Hayes Place, Kent (gr. Mr. Grandfield), for Begonias and hardy plants.

Silver Flora Medal.

To Messrs. Cuthbert, Southgate, for Azaleas.

To Messrs. Low, Bush Hill Park, for Carnations &c.

To the Hon. Walter Rothschild, Tring Park (gr. Mr. Dye), for *Gloriosa Rothschildiana*.

To Sir Samuel Scott, Westbury Manor, Brackley (gr. Mr. Tappin), for Carnations.

Silver Banksian Medal.

To Messrs. Dobbie, Rothesay, for Violas.

To Messrs. Gwillim, New Eltham, for Cinerarias.

To Mr. H. B. May, Edmonton, for miscellaneous flowering plants.

To Messrs. Paul, Waltham Cross, for Roses &c.

To Mr. G. Reuthe, Keston, for hardy plants.

To Messrs. Ware, Feltham, for alpine plants.

To Messrs. Veitch, Chelsea, for Hydrangeas &c.

Bronze Flora Medal.

To Messrs. Cripps, Tunbridge Wells, for Japanese Maples.

To Mr. L. R. Russell, Richmond, for Clematises.

Bronze Banksian Medal.

To Messrs. Clark, Dover, for hardy plants.

To Messrs. Jackman, Woking, for alpine plants.

Award of Merit.

To Carnation 'H. Elliott' (votes, unanimous), from Mr. H. Elliott, Hassocks. A tree variety of strong, vigorous habit, with large well-formed flowers of a lovely rosy-pink shade. A seedling raised by the exhibitor.

To Pelargonium 'Clorinda' (votes, unanimous), from Messrs. Cannell, Swanley. A sweet-scented variety, raised from a Cape Pelargonium \times *P. quercifolium*. The foliage is similar to several of the scented varieties, and the flowers in good trusses of rosy-pink, each flower having a purple stripe at the base of the two upper petals. A very pretty variety.

Other Exhibits.

The Dowager Duchess of Roxburghe, Broxmouth Park, Dunbar, sent seedling Carnations.

The Duke of Rutland, Belvoir Castle (gr. Mr. Divers), sent *Myosotis dissitiflora* Dyeræ.

Messrs. Guttman & Weber, New York, sent Carnation 'Victory,' which the Committee wished to see again.

Mr. T. Judd, Hatchgate, Reading, staged Pansy 'Mrs. Judd.'

J. T. Bennett-Poë, Esq., Holmwood, Cheshunt, brought *Pinguicula caudata superba*.

H. J. Elwes, Esq., Colesborne Park, Cheltenham, sent two varieties of *Bomaria*.

Messrs. Brown, Peterborough, staged miscellaneous flowers.

Mr. Cubberley, The Gardens, Fairlawn, Tonbridge, brought Rhododendrons.

Messrs. Cheal, Crawley, sent hardy plants.

Messrs. Cutbush, Highgate, brought Roses.

Miss Hopkins, Knutsford, staged hardy plants.

Mr. N. Lewis, Bridgwater, staged Anemones.

Messrs. Paul, Cheshunt, sent new Roses &c.

Messrs. Peed, Streatham, brought alpine plants.

Mr. A. Perry, Winchmore Hill, staged hardy plants.

E. E. Heath, Esq., Holmwood (gr. Mr. Philpott), sent *Rhododendron Falconeri*.

Mr. R. Sydenham, Birmingham, staged Sweet Peas.

Mr. R. Upton, Guildford, brought hardy plants.

FLORAL COMMITTEE, MAY 15, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-eight members present.

Awards Recommended :—*Silver-gilt Flora Medal.*

To Mr. J. Douglas, V.M.H., Edenside, Great Bookham, for Auriculas.

To Sir E. Loder, Bart., Leonardslee, Horsham (gr. Mr. Cook), for Rhododendrons &c.

To Mr. G. Mount, Canterbury, for Roses.

Silver-gilt Banksian Medal.

To Lord Aldenham, Elstree (gr. Mr. Beckett, V.M.H.), for flowering shrubs.

To Messrs. B. R. Cant, Colechester, for Roses.

To Mr. H. B. May, Edmonton, for a collection of hardy Ferns.

To Messrs. Ware, Feltham, for Begonias &c.

Silver Flora Medal.

To Messrs. Carter, High Holborn, W.C., for Cinerarias.

To Messrs. Cannell, Swanley, for Roses and Pelargoniums.

To Messrs. Dobbie, Rothesay, for Pansies, Violas, and Tulips.

To Messrs. Peed, Streatham, for Acers &c.

To Mr. R. Sydenham, Birmingham, for Sweet Peas.

To Messrs. Turner, Slough, for Azaleas &c.

To Messrs. J. Waterer, Bagshot, for Rhododendrons.

To Mr. C. G. van Tubergen, Jun., Haarlem, for Regelio-Cyclus Irises.

Silver Banksian Medal.

To Messrs. Bunyard, Maidstone, for herbaceous flowers.

To Messrs. Cutbush, Highgate, for miscellaneous plants.

To Messrs. Cuthbert, Southgate, for Ivy-leaved Pelargoniums.

To Messrs. J. Veitch, Chelsea, for Schizanthuses.

Bronze Flora Medal.

To Messrs. Clark, Dover, for herbaceous flowers.

To Mr. A. Perry, Winchmore Hill, for hardy plants.

To Mr. M. Prichard, Christchurch, for cut flowers.

To Mr. A. R. Upton, Guildford, for hardy plants.

Bronze Banksian Medal.

To Miss Hopkins, Knutsford, for hardy plants.

To C. S. Layton, Esq., Harrow Weald, for Calceolarias.

To J. A. Young, Esq., West Hill, Putney (gr. Mr. Street), for Cinerarias.

First-class Certificate.

To *Davallia solida* var. *superba* (votes, unanimous), from Mr. H. B. May, Edmonton. A wonderful improvement on the type. All the young fronds are suffused with a delicate shade of red, and somewhat curled, and of graceful form. A very fine decorative variety.

Award of Merit.

To *Dianthus* 'Spencer Bickham' (votes, 11 for, 3 against), from Messrs. R. Veitch, Exeter. A very pretty dwarf rock plant, with bright reddish flowers, over $\frac{1}{2}$ inch across, with serrated petals, and the stalk about 5 inches long. Raised from *D. alpinus* \times *D. deltoidea*.

To *Rhododendron* 'Mrs. E. S. Stirling' (votes, 23 for, 1 against), from Messrs. J. Waterer, Bagshot. A remarkably fine variety with a noble truss of large beautiful deep pink flowers, free from spots or blotch.

To *Iris* 'Hecate' (votes, unanimous), from C. G. van Tubergen, Jun., Haarlem, raised from *I. Suwarowi* \times *I. iberica*, and belonging to the

Regelio-Cyclus group. Like all the varieties of this section raised by Mr. Tubergen, this is a perfectly charming variety with a unique

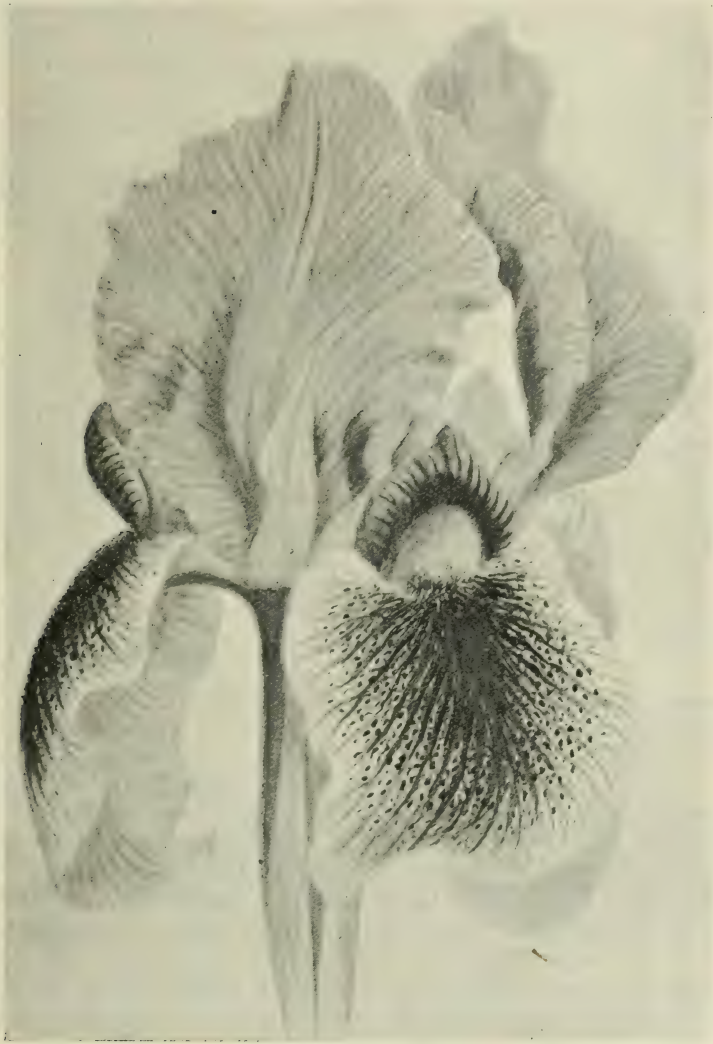


FIG. 54.—IRIS × 'HECATE.' (*Journal of Horticulture.*)

colour. The standards are of a rich deep violet; the falls have a dark-bronze centre, with veins of the same colour, with the spaces between the veins of rich yellow.

Other Exhibits.

Lady Alice Dundas, West Stoke House, Chichester, sent Carnations.
Lord Stalbridge, Motcombe House, Shaftesbury, sent a Pelargonium.
Mr. J. Harris, Swansea, staged Anemones.
Mr. H. Elliott, Hassocks, brought Carnation 'England.'

Mr. T. Leslie, Trinity Cottage Gardens, Edinburgh, sent *Rhododendrons*.

C. E. Heath, Esq., Holmwood, Surrey, sent an unnamed *Richardia*.

Sir Trevor Lawrence, Burford, Dorking, sent *Asparagus filicinus*, a variety from the Himalayas. The Committee asked to see it again.

Lord Northampton, Castle Ashby, Northampton (gr. Mr. Searle), staged a variegated *Pelargonium* 'Lord Northampton.'

R. Garton, Esq., Lythe Hill, Haslemere, brought *Verbena* 'Marie Thorne.'

Mary Countess of Ilchester, Holland House, Kensington (gr. Mr. Dixon), sent *Houttuynia cordata*.

Messrs. Brown, Peterborough, staged miscellaneous flowers.

Mr. Farrar, Clapham, Lancaster, brought alpine plants.

Messrs. Gilbert, Bourne, Lincs., sent *Anemones* and *Tulips*.

Messrs. Jackman, Woking, staged *Clematises*.

Mr. N. Lewis, Bridgwater, staged *Anemones*.

Messrs. Paul, Cheshunt, brought shrubs and *Roses*.

Messrs. W. Paul, Waltham Cross, sent *Roses*.

Messrs. Sutton, Reading, sent *Myosotis*.

FLORAL COMMITTEE, MAY 29, 1906.

TEMPLE SHOW.

Mr. W. MARSHALL, V.M.H., in the Chair, and thirty-two members present.

Awards Recommended :—

First-class Certificate.

To *Nephrolepis exaltata superba* (votes, unanimous), from Mr. H. B. May, Edmonton. This graceful variety received an Award of Merit on December 19, 1905, and now received the higher award. The habit of the plant is erect, with handsome arching fronds, and the pinnæ much divided and heavily crested the full length of the fronds.

To *Nephrolepis exaltata elegantissima* (votes, unanimous), from Mr. W. J. Godfrey, Exmouth. A beautiful variety, with long tapering fronds, with much divided and irregular pinnæ, giving the plant a distinct and pleasing appearance. We believe it is of American origin.

Award of Merit.

To *Begonia* 'Mrs. J. B. Blackmore' (votes, unanimous), from Messrs. Blackmore & Langdon, Bath. A tuberous variety, with medium-sized, well-formed double flowers of a rich rosy salmon shade.

To *Begonia* 'Millicent' (votes, unanimous), from Messrs. Blackmore & Langdon. An immense double flower, of handsome shape and great substance, and a lovely salmon colour; tuberous.

To *Begonia* 'Alice' (votes, unanimous), from Messrs. Blackmore & Langdon. A medium-sized double-flowered variety, of a distinct colour, viz. pale pink, with a margin of carmine to each petal. A very pretty tuberous variety.

To *Daphne rupestris* (votes, unanimous), from Mr. R. Farrer, Lancaster. This may be described as a charming miniature-form of *Daphne cneorum*; the flowers are of the same colour, and the plant only about 3 inches high.

To Rose 'Hiawatha' (votes, unanimous), from Messrs. F. Cant, Colchester, Messrs. Hobbies, Dereham, and Messrs. W. Paul, Waltham Cross. This was said to be a seedling from 'Crimson Rambler,' but is of 'Wichuraiana' type. The plant is a strong grower and profuse bloomer; the flowers are single, rather small, borne in great clusters, and of a purplish crimson colour, suffused with bright scarlet, and a little white round the stamens. A very effective variety.

To Clematis 'Lady Northcliffe' (votes, 11 for), from Messrs. Jackman, Woking. A single variety of the 'Jackmanii' type, with pretty deep violet flowers, which are over 6 inches across.

To *Acrostichum decoratum* (votes, unanimous), from Messrs. Hill, Edmonton. This is an introduction from Brazil, and said to be quite new. The leaves or fronds are 10 inches long and about 3 inches broad, dark green, with brown scales at the margin.

To Rose 'Kathleen' (votes, 11 for, two against), from Messrs. W. Paul, Waltham Cross. The flowers of this variety are rather small, single, sweetly scented, and produced in large clusters of moderate vigour. It should prove an excellent pillar rose, and belongs to the multiflora section.

To Carnation 'Mrs. W. James' (votes, 13 for, 2 against), from W. James, Esq., Chichester. A border variety, with pure white, well-formed large flowers, but scentless.

To Rhododendron 'Marchioness of Tweeddale' (votes, unanimous), from Messrs. Waterer, Bagshot. A very fine hardy variety, with large handsome trusses of flowers, of a rosy-crimson colour; the upper segments are a pale shade, with yellow spots.

To Gladiolus 'Ne Plus Ultra' (votes, unanimous), from Messrs. Wallace, Colchester. An early flowering variety, with flowers of a rich carmine colour, with a white blotch down the centre of each segment.

To Hippeastrum 'Rose Madder' (votes, unanimous), from Messrs. Ker, Liverpool. A very large and distinct variety of perfect form and of the colour its name indicates.

To Hippeastrum 'Jasper' (votes, unanimous), from Messrs. Ker, another fine distinct variety, the segments being of deep rose, shading to bright red at the base.

To *Vitis Henryana* (votes, unanimous), from Messrs. Hobbies, Dereham. A species found by Dr. Henry in China, and somewhat resembling the Virginian creeper, but much finer in colouring, each leaf being marked by silver veins, and the colour of the leaves is a brilliant red, passing with age into a darker shade.

FLORAL COMMITTEE, JUNE 12, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Lord Aldenham, Elstree (gr. Mr. E. Beckett, V.M.H.), for cut shrubs.

To W. H. Burnett, Guernsey, for Carnations.

To Mrs. Bischoffsheim, Warren House, Stanmore (gr. W. Ellis), for Malmaison Carnation.

To Lady Northcliffe, Sutton Place, Guildford (gr. Mr. Goatley), for Calceolarias and herbaceous flowers.

Silver-gilt Banksian Medal.

To Mr. M. Prichard, Christchurch, for hardy flowers.

Silver Flora Medal.

To Mr. W. J. Godfrey, Exmouth, for miscellaneous flowers.

To Messrs. Bunyard, Maidstone, for herbaceous flowers and Rhododendrons.

To Messrs. Dobbie, Rothesay, for Aquilegias.

To Mr. H. B. May, Edmonton, for Ixoras.

To Mr. Amos Perry, Winchmore Hill, for hardy flowers.

To Mr. L. R. Russell, Richmond, for stove and greenhouse plants.

To Sir Samuel Scott, Westbury Manor, Brackley (gr. Mr. Tappin), for Carnations.

To Messrs. J. Veitch, Chelsea, for new and rare plants.

To Messrs. Wallace, Colchester, for hardy flowers.

To Messrs. Peed, Streatham, for alpine plants.

Silver Banksian Medal.

To Messrs. Baker, Codsall, for Aquilegias and Pelargoniums.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Gilbert, Bourne, for hardy flowers.

To Messrs. Kelway, Langport, for Pæonies, Delphiniums, &c.

To Messrs. Low, Bush Hill Park, for Carnations.

To Mr. G. Reuthe, Keston, for alpine and herbaceous plants.

To Mr. R. C. Notcutt, Woodbridge, for hardy flowers.

To Messrs. Cheal, Crawley, for flowering shrubs.

Bronze Flora Medal.

To Messrs. Barr, Covent Garden, for herbaceous flowers.

Bronze Banksian Medal.

To Messrs. Bath, Wisbech, for Pyrethrums &c.

To W. James, Esq., West Dean Park, Chichester (gr. Mr. Smith), for a splendid plant of Malmaison Carnation.

Award of Merit.

To Papaver 'Mrs. Perry' (votes, 13 for, 1 against), from Mr. A. Perry, Winchmore Hill. A variety of the Oriental type, with exquisite

flowers of pale orange, heavily suffused with salmon colour. A charming variety.

To Papaver 'Queen Alexandra' (votes, 13 for, 2 against), from Mr. A. Perry. Another of the Oriental type, of large size and cupped shape.

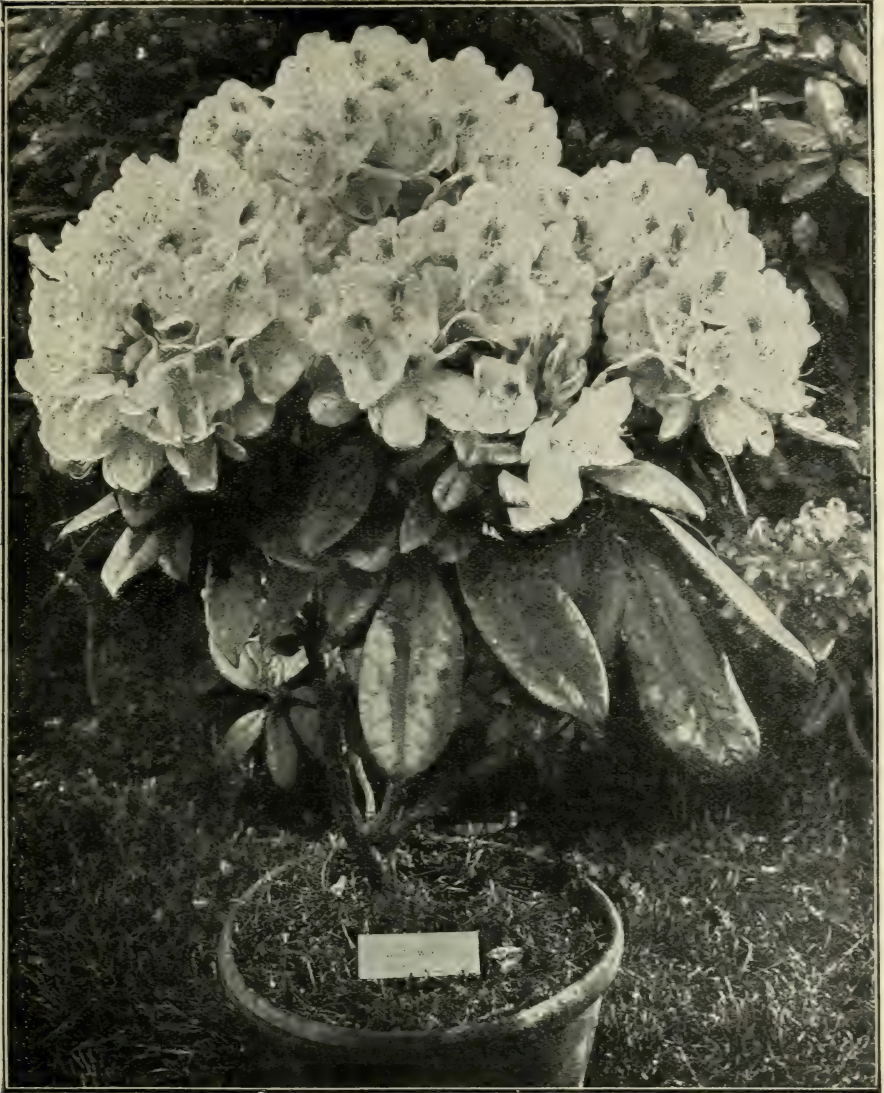


FIG. 55.—RHODODENDRON 'GOMER WATERER.' (*Gardeners' Chronicle*.)

The colour is a deep salmon, shaded with scarlet, and the flowers are said to keep well in a cut state.

To Rhododendron 'Viscount Powerscourt' (votes, 13 for, 1 against), from Messrs. Waterer, Bagshot. Flowers and trusses very large, of a purplish-red shade, with very dark spots.

To *Rhododendron* 'Gomer Waterer' (votes, unanimous), from Messrs. Waterer, Bagshot. Flowers and trusses very large and abundantly produced; the colour is a delicate rose, tinged with lilac. A lovely variety.

To *Gloriosa Rothschildiana citrina* (votes, unanimous), from the Hon. Walter Rothschild, M.P., Tring. A very distinct variety; the flowers are a greenish yellow, with a dark midrib down the centre of each segment.

To *Verbena* 'Snowflake' (votes, 18 for), from Messrs. Cutbush, Highgate. This is the finest white variety we have seen: the flowers and truss are large, good shape, and borne in profusion. Should make a valuable bedding plant.

Other Exhibits.

G. Nevens, Esq., Bromley, sent Carnation 'Queen Alexandra.'

H. S. Bartlett, Esq., Shooter's Hill, sent Rose 'Double Pin Boursault.'

Miss Philbrick, Halstead, brought *Verbena* 'Evelyn Wren.'

Mr. B. Haig, Maidenhead, staged *Pelargonium* 'Queen of Denmark.'

Messrs. Bull, Chelsea, brought foliage plants.

Messrs. Cutbush, Highgate, sent *Verbenas*.

Mr. J. Douglas, V.M.H., Great Bookham, staged *Iris*es.

Messrs. Hobbies, Dereham, brought *Roses*.

Lady Lushington, Stock House, Great Bedwyn, sent alpine plants.

Messrs. Laing, Forest Hill, brought *Streptocarpus*es.

Mr. S. Mortimer, Farnham, staged *Carnations*.

Messrs. Paul, Cheshunt, sent miscellaneous flowers.

Messrs. R. Smith, Worcester, brought hardy flowers.

Mr. A. R. Upton, Guildford, brought hardy plants.

J. A. Young, Esq., Stone House, Putney, sent *Calceolarias*.

Messrs. J. Carter, High Holborn, staged *Gloxinias* and *Lobelias*.

A. Waterer, Esq., Knap Hill, Woking, sent *Rhododendrons*.

FLORAL COMMITTEE, JUNE 26, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-nine members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Mr. Waters, Balcombe, Sussex, for *Carnations*.

Silver-gilt Banksian Medal.

To Messrs. Wallace, Colchester, for herbaceous flowers.

To Messrs. J. Veitch, Chelsea, for greenhouse and herbaceous plants.

To Messrs. Cutbush, Highgate, for hardy flowers.

Silver Flora Medal.

To Messrs. Bath, Wisbech, for herbaceous *Pæonies*.

To Messrs. Clark, Dover, for hardy flowers.

- To Mr. H. Eckford, Wem, for Sweet Peas.
- To Mr. A. Perry, Winchmore Hill, for hardy flowers.
- To Mr. M. Prichard, Christchurch, for hardy flowers.
- To Messrs. Waterer, Bagshot, for Kalmias.

Silver Banksian Medal.

- To Messrs. Barr, Covent Garden, for herbaceous flowers.
- To Messrs. Bunyard, Maidstone, for herbaceous flowers.
- To Messrs. Cannell, Swanley, for Cacti and Carnations.
- To Messrs. B. R. Cant, Colchester, for Roses.
- To Messrs. Laing, Forest Hill, for Caladiums.
- To Messrs. Paul, Cheshunt, for Pæonies and Roses.
- To Mr. A. R. Upton, Guildford, for hardy flowers.
- To J. A. Young, Esq., Stone House, Putney (gr. Mr. Street), for Pelargoniums.

Bronze Flora Medal.

- To Messrs. Carter Page, 52 London Wall, for Dahlias, Fuchsias, &c.
- To Messrs. Cheal, Crawley, for hardy flowers.
- To Messrs. Kelway, Langport, for Pæonies and Delphiniums.
- To Messrs. Low, Bush Hill Park, for Carnations.
- To Mr. G. Reuthe, Keston, Kent, for hardy flowers.

Bronze Banksian Medal.

- To Messrs. R. Smith, Worcester, for hardy flowers &c.

Award of Merit.

To Antirrhinum 'Cottage Maid' (votes, 9 for), from Messrs. Dobbie, Rothesay. A tall growing variety with long spikes of deep salmon orange-coloured flowers. A very distinct, handsome variety.

To Pæony 'Mons. Chas. Lévêque' (votes, 13 for, 1 against), from Messrs. Bath, Wisbech. A very strong growing variety, with large double flowers of good form, and a pale pink or rose colour, which shades to white with age.

To Rose 'Madame J. Gravereaux' (votes, unanimous), from Messrs. Paul, Cheshunt. A Hybrid Tea, apparently of strong, sturdy habit, with large pure white flowers of much substance and excellent form.

Other Exhibits.

W. H. Myers, Esq., Swanmore Park, Bishop's Waltham, sent *Anchusa italica* var. 'Opal.'

Mrs. Scott Elliot, Hawick, sent Aquilegias.

G. Ferguson, Esq., The Hollies, Weybridge, sent Delphiniums.

F. Bonney, Esq., Rugeley, brought Rose 'Colton Pearl.'

Mr. F. E. Leys, Romford, staged Carnations.

Mr. J. B. Taylor, Sherfield Manor, Basingstoke, sent Climbing Rose 'Mrs. J. B. Taylor.'

F. H. Goddard, Esq., Putney, sent Verbena 'May Goddard.'

From the State Botanic Gardens, Brussels, came *Begonia Poggei*. A species from the Congo.

H. Weller, Esq., Leatherhead, sent Rose 'Mrs. Henry Weller.'

A. Gordon Russell, Esq., Islip, Oxford, sent *Petunias*.

Mrs. A. E. Sprier, Belair, Dulwich, sent a double-flowered sport of a *Tropæolum*, with claret-coloured flowers.

Mr. F. H. Bradley, Peterborough, brought Rose 'Kathleen Burdock.'

Messrs. W. Bull, Chelsea, staged English and Spanish Irises.

Messrs. Cripps, Tunbridge Wells, brought flowering and foliage trees.

Miss Hemus, Upton-on-Severn, sent Sweet Peas.

Miss Hopkins, Knutsford, staged hardy flowers.

Mr. H. B. May, Edmonton, brought Zonal Pelargoniums.

Messrs. Peed, Streatham, staged alpine plants.

Mr. L. R. Russell, Richmond, sent *Dimorphanthus*.

Mr. R. Farrer, Clapham, Lancs., brought alpine plants.

FLORAL COMMITTEE, JULY 10, 1906, AT HOLLAND HOUSE.

Mr. W. MARSHALL, V.M.H., in the Chair, and thirty members present.

Awards Recommended :—

First-class Certificate.

To *Osmunda Mayi* (votes, unanimous), from Mr. H. B. May, Edmonton. A very handsome form of *Osmunda palustris*. The pinnules are more crowded than in the type, and are lined with white marks.

Award of Merit.

To Rose 'Queen of Spain' (votes, unanimous), from Messrs. Bide, Farnham. A Hybrid Tea raised from seed of 'Antoine Rivoire.' Flowers large, well shaped, with substantial petals of a soft pale pink shading to a paler shade with age. Apparently a good vigorous variety.

To Begonia 'Miss May Sutton' (votes, unanimous), from Messrs. Blackmore & Langdon, Bath. A tuberous variety with large double flowers of a pleasing pale pink shade of colour.

To Begonia 'Purity' (votes, unanimous), from Messrs. Blackmore & Langdon. A medium-sized double white-flowered variety, of perfect form. This is one of the best tuberous varieties we have seen.

To Pelargonium 'Hector Piacomelli' (votes, 10 for, 4 against), from Messrs. Cuthbert, Southgate. An Ivy-leaved variety with large semi-double flowers, with pinkish ground colour, marked with deep red.

To *Chrysanthemum maximum* var. 'Mrs. Charles Lowthian Bell' (votes, unanimous), from Mr. Dowson, Middlesbrough. The finest variety we have seen. The flowers are of the usual type, but very large without being coarse.

To *Davallia Mayii* (votes, unanimous), from Mr. H. B. May, Edmonton. A seedling from *D. elegans*, but having larger and broader pinnules than that variety. An elegant variety.

To *Eustoma (Lisianthus) Eythropsense* (votes, 11 for, 1 against) from Miss Rothschild, Eythrop (gr. Mr. Gibbs). This was stated to be a hybrid from *Eustoma Russellianum* × *Exacum macranthum*. The flowers of this pretty greenhouse plant are similar in shape and colour

to *Eustoma Russellianum*, viz. a rich bluish-purple, and the foliage is a mingling of both parents. A very ornamental and useful plant.

To *Richardia* 'Mrs. Roosevelt' (votes, 12 for), from Mr. A. Perry, Winchmore Hill. A very pretty medium-sized flower, of a charming shade of canary yellow.

To *Nymphaea* 'James Brydon' (votes, unanimous), from Mr. A. Perry. A magnificent crimson-flowered variety, of large size, fine form, and the best of this colour.

To Rose 'Mrs. Jardine' (votes, 12 for, 2 against), from Messrs. Dicksons, Newtownards. A Hybrid Tea variety with large flowers of a lovely rose colour.

Other Exhibits.

H. R. Taylor, Esq., Oakleigh, Cheam (gr. Mr. Gilbert), sent Carnations.
Mr. T. Hummerston, Epping, staged Pelargoniums.

Messrs. Dickson, Chester, brought *Ulmus cornubiensis Dicksonii*. A fine golden Elm, not quite in character when exhibited.

Mr. H. L. Popham, Bournemouth, sent Pelargoniums.

Mr. W. S. Hestington, Yore Croft, Ripon, exhibited Sweet Peas.

Messrs. Thompson & Morgan, Ipswich, staged Hybrid Pinks.

Mr. R. Greenfield, Tyn-y-coed, Llanrhos, sent Asparagus.

Mrs. Berkeley, Kingscliffe, Fleet, sent *Eschscholtzia* 'Yellow Prince,' which the Committee desired to see again.

Mr. R. Sydenham, Birmingham, staged Sweet Peas.

FLORAL COMMITTEE, JULY 17, 1906.

Mr. H. B. MAY in the Chair, and eighteen members present.

Awards Recommended:—

Gold Medal.

To Mr. C. W. Breadmore, Winchester, for Sweet Peas.

Silver-gilt Banksian Medal.

To Mr. H. B. May, Edmonton, for Crotons.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for Carnations.

To Mr. J. Douglas, V.M.H., Edenside, Great Bookham, for Carnations.

To R. J. Measures, Esq., Cambridge Lodge, Camberwell, S.E. (gr. Mr. Smith), for *Sarracenia* &c.

To Messrs. Wallace, Colchester, for hardy flowers.

Silver Banksian Medal.

To Messrs. Clark, Dover, for hardy flowers.

To Lord Hillingdon, Hillingdon Court, Uxbridge (gr. Mr. Allan), for *Nymphaeas*.

To Sydney Morris, Esq., Wretham Hall, Thetford (gr. Mr. Henley), for Carnations.

To Mr. A. Perry, Winchmore Hill, for hardy flowers.

To Mr. M. Prichard, Christchurch, for hardy flowers.

Award of Merit.

To Delphinium 'Cintra' (votes, unanimous), from G. Ferguson, Esq., The Hollies, Weybridge (gr. Mr. Smith). This is the best white variety we have seen, the flowers being very large and shapely, borne on strong vigorous spikes, and the colour a good white.

To *Nemesia nana compacta grandiflora* 'Prince of Orange' (votes, unanimous, for strain), from Mr. W. H. Gardiner, Mill Street, St. Osyth. A sturdy, compact form, very floriferous, with exceptionally large flowers of a rich orange colour.

To Carnation 'Cupid' (votes, unanimous), from Mr. J. Douglas, V.M.H., Edenside, Great Bookham. A pink self flower of medium size, perfect form, a non-splitting calyx, and sweetly scented.

To Carnation 'Robert Berkeley' (votes, unanimous), from Mr. J. Douglas, V.M.H. A brilliant scarlet self of the largest size for a border variety, with a full centre, fine form, and slightly scented.

To Sweet Pea 'Rosy Morn' (votes, 9 for, 4 against), from Messrs. Cannell, Swanley. A very pretty rosy pink variety.

Other Exhibits.

Messrs. Bath, Wisbech, staged hardy flowers.

Messrs. Cheal, Crawley, brought hardy flowers.

Mr. W. Deal, Kelvedon, sent Sweet Peas.

Messrs. Dobbie, Rothesay, staged Godetias.

Messrs. W. Paul, Waltham Cross, sent Roses.

Mr. H. H. Crane, Highgate, brought New Violas.

Mr. E. W. King, Coggeshall, sent Aster 'Early Wonder.'

Messrs. Hartland, Cork, sent *Galega Hartlandi bicolor grandiflora*.

J. Bradshaw, Esq., Southgate, staged herbaceous plants.

Sir E. G. Loder, Bart., Leonardslee, Horsham, sent *Callistemon lanceolatus*.

Mr. J. Hudson, V.M.H., gr. to Leopold de Rothschild, Esq., Gunnersbury House, W., brought *Eustoma Russellianum*. It was decided that the award given on July 10, 1906, to *E. Eythropense* be confirmed; but as it is identical with *E. Russellianum*, it should stand under the latter name.

Mrs. Berkeley, Kingscliffe, Fleet, sent *Eschscholtzia* 'Yellow Prince,' which arrived in bad condition.

FLORAL COMMITTEE, JULY 31, 1906.

Mr. H. B. MAY in the Chair, and twenty-two members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Mr. H. B. May, Edmonton, for Ferns, chiefly hybrids.

To Percy Waterer, Esq., Fawkham, for Phloxes.

Silver-gilt Banksian Medal.

To Mr. C. W. Breadmore, Winchester, for Sweet Peas.

To Mr. A. F. Dutton, Iver, for Carnations.

Silver Flora Medal.

To Messrs. Artindale, Sheffield, for Carnations.

To Mr. J. Douglas, Great Bookham, for Carnations.

To Messrs. Sutton, Reading, for Gloxinias.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations.

To Mr. A. Perry, Winchmore Hill, for hardy flowers.

To Messrs. Kelway, Langport, for Gladioli.

Bronze Flora Medal.

To R. Hoffmann, Esq., Tower House, Streatham (gr. Mr. Tomlinson), for Caladiums.

Award of Merit.

To *Nephrolepis pectinata* var. *canaliculata* (votes, unanimous), from Mr. H. B. May, Edmonton. A very curious and distinct variety; each frond is deeply channelled, the pinnules forming a canal-like appearance, and each pinnule is surmounted by a fine crested growth. The fronds are nearly erect, arching a little near the top.

To Caladium 'Dorothy Peto' (votes, unanimous), from R. Hoffmann, Esq., Tower House, Streatham. A pretty small growing variety with light rose-coloured leaves, margined and lightly blotched with green.

To *Nymphaea atropurpurea* (votes, unanimous), from Lord Hillingdon, Uxbridge. A splendid variety with crimson purple flowers with deep yellow anthers. Flowers of large size and much substance.

To Sweet Pea 'Audrey Crier' (votes, 12 for), from Mr. C. Breadmore, Winchester. A large-flowered beautiful rosy pink variety.

To *Stokesia cyanea præcox* (votes, unanimous), from Mr. A. Perry, Winchmore Hill, and Messrs Wallace, Colchester. An early flowering form of *Stokesia cyanea*, growing about 18 inches high, and covered with blue flowers about 1 inch across. A very hardy plant introduced from North America.

Other Exhibits.

Mr. F. M. Bradley, Peterborough, staged Carnations.

Messrs. Cannell, Swanley, brought Begonias.

Messrs. Bull, Chelsea, brought Hydrangeas.

Messrs. Carter, High Holborn, W.C., sent Stocks.

Messrs. Cheal, Crawley, sent hardy flowers.

Messrs. Cuthbert, Southgate, staged Roses, Lilies, &c.

Messrs. Gunn, Birmingham, brought Phloxes.

The King's Acre Nursery Co., Hereford, sent Roses.

Messrs. Laing, Forest Hill, brought Crotons.

Messrs. Paul, Waltham Cross, sent hybrid Roses.

Mr. M. Prichard, Christchurch, staged hardy flowers.

Mr. G. Reuthe, Keston, Kent, sent hardy flowers.

Mr. L. R. Russell, Richmond, brought Ivies.

Messrs. R. Smith, Worcester, sent shrubs.

Messrs. Ware, Feltham, staged herbaceous flowers.

Messrs. Wallace, Colchester, brought hardy flowers.

Mr. R. C. Notcutt, Woodbridge, sent hardy flowers.

Miss F. A. Towler, Great Bookham, sent Phlox 'The King.'

Mr. A. Andrews, Wickham Market, brought Chrysanthemum 'The Speaker.'

Mr. H. E. Ward, Vicar's Cross, Chester, sent Sweet Peas.

Mrs. W. Mathews, Chesham Park, Anerley, staged Coleuses.

Mrs. Armitage, Haygrass, Taunton, sent Carnations.

Mr. J. C. Hawley, Rotherham, sent a Chrysanthemum.

FLORAL COMMITTEE, AUGUST 14, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Cannell, Swanley, for annuals.

To Messrs. Kelway, Langport, for Gladioli.

Silver-gilt Banksian Medal.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for miscellaneous plants.

To Messrs. Gunn, Birmingham, for Phlox.

Silver Flora Medal.

To Mr. S. Mortimer, Farnham, for Dahlias.

To Mr. M. Prichard, Christchurch, for hardy flowers.

To Messrs. Ware, Feltham, for hardy flowers.

To Messrs. Webb & Brand, Saffron Walden, for Hollyhocks.

Silver Banksian Medal.

To Messrs. Artindale, Sheffield, for Fuchsias and Pentstemons.

To Mr. A. Perry, Winchmore Hill, for aquatic flowers &c.

To Messrs. Wallace, Colchester, for hardy flowers.

Bronze Flora Medal.

To Messrs. Barr, Covent Garden, for hardy flowers.

Award of Merit.

To Gladiolus 'Golden Ray' (votes, unanimous), from Messrs. Kelway, Langport. The colour of this variety is a pale yellow, with a deep orange blotch on the lip, with pinkish strips running through it.

To Gladiolus 'Mrs. Cecil Baring' (votes, unanimous), from Messrs. Kelway. A variety with great spikes of large pale lemon-coloured flowers; the lip is marked with dark red spots. A very telling variety.

To Gladiolus 'Mrs. Codrington' (votes, 14 for), from Messrs. Kelway. A most difficult flower to describe, as it is a mixture of violet, rose, carmine, and yellow, the latter colour being the margin of the lower petals.

To Rose 'Gottfried Keller' (votes, 15 for), from Messrs. Paul, Cheshunt. A very pretty single variety raised by Mr. Frobel from the Austrian Briar \times a Tea variety, and resembling the former more than the latter. The flowers are a soft rose shading to a bright yellow centre.

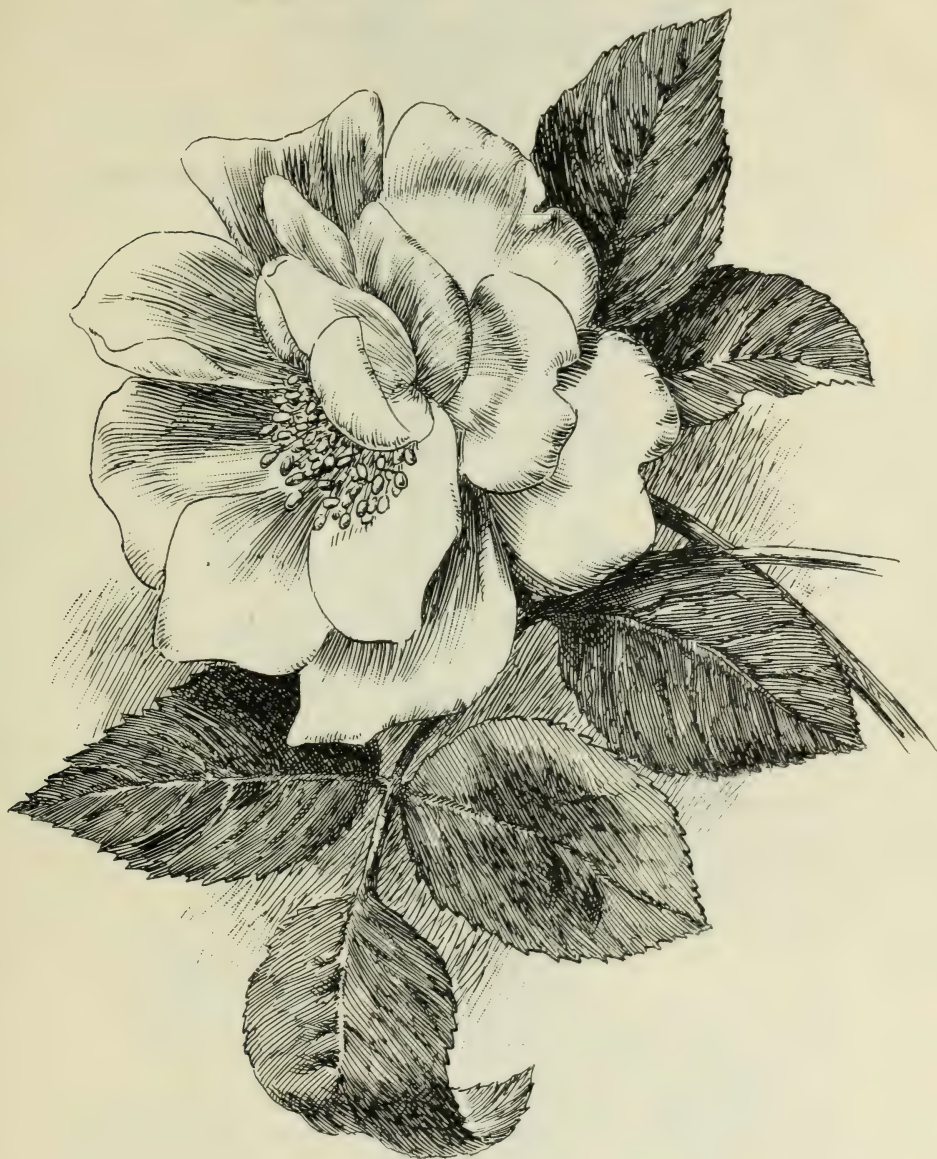


FIG. 56. — ROSE 'GOTTFRIED KELLER.' (*Journal of Horticulture*.)

Other Exhibits.

- H. J. Elwes, Esq., Colesborne, Glos., sent *Gladiolus hybridus*.
 Miss Violet Fellowes, Shotesham Park, Norwich, sent Carnations.
 F. W. George, Esq., Thornleigh, Bournemouth, also sent Carnations.
 C. S. Aylward, Esq., Muswell Hill, staged Carnations.

To Gladiolus 'White Knight' (votes, unanimous), from Messrs. Kelway. A splendid white variety, with a bold spike.

Messrs. Cutbush, Highgate, brought *Chrysanthemum maximum* 'The Speaker.'

C. Watney, Esq., Garston Manor, Watford, sent Carnations.

H. Morris, Esq., Chipping Norton, sent Carnations.

A. G. Russell, Esq., Islip, Oxford, sent Carnations.

Mr. J. Cooper, Chipping Norton, staged Carnations.

F. D. Godman, Esq., South Lodge, Horsham, sent miscellaneous flowers.

Viscount Deerhurst, Dynes Hall, Halstead, sent Stock 'Dynes Hall.'

Messrs. Bull, Chelsea, brought miscellaneous plants.

Messrs. Cutbush, Highgate, staged Carnations.

Miss Hopkins, Knutsford, sent hardy flowers.

Messrs. J. Carter, High Holborn, brought Antirrhinums.

Messrs. Paul, Cheshunt, sent cut shrubs.

Mrs. Stanton, Child's Hill, N.W., sent Fern's.

FLORAL COMMITTEE, AUGUST 28, 1906.

Mr. H. B. MAY in the Chair, and eighteen members present.

Awards Recommended :—

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Cannas.

To Messrs. Carter Page, London Wall, for Dahlias.

To Messrs. Kelway, Langport, for Gladioli.

To Messrs. J. Veitch, Chelsea, for miscellaneous plants.

Silver Banksian Medal.

To Messrs. Bunyard, Maidstone, for hardy flowers.

To Messrs. Cheal, Crawley, for Shrubs and Dahlias.

To Messrs. Gunn, Birmingham, for Phloxes.

To Sir E. G. Loder, Bart., Horsham, for hardy flowers.

To Mr. A. Perry, Winchmore Hill, for Nymphæas &c.

To Messrs. Ware, Feltham, for Dahlias.

Bronze Flora Medal.

To Messrs. Clark, Dover, for hardy Flowers and Dahlias.

Award of Merit.

To Dahlia 'Fugi San' (votes, unanimous), from Messrs. Cheal, Crawley. Flower single, large, of a deep buff colour, with a red ring round the disc.

To Dahlia 'Dr. G. G. Gray' (votes, 14 for), from Messrs. Stredwick, St. Leonards-on-Sea. A Cactus variety, of a gorgeous crimson colour, fine shape, and large size.

To *Gilia coronopifolia* (votes, unanimous), from Messrs. Clark, Dover. One of the most beautiful biennials we have, and though an old plant it is

rare. The flowers are borne in large clusters, and are of a bright shade of red and most effective. The foliage is very fine and divided and very attractive. As this is quite hardy it should be better known and extensively grown.



FIG. 57.—*GILIA CORONOPIFOLIA*.

To Dahlia 'Princess Mary' (votes, unanimous), from Messrs. Hobbies, Dereham. A Cactus variety, of large size, fine form, and a deep apricot colour changing to buff.

To Phlox 'Tapis Blanc' (votes, unanimous), from Messrs. Gunn, Birmingham. A very dwarf perennial variety, with large trusses of pure white flowers, of good size. It will prove a useful acquisition.

Other Exhibits.

Miss E. Edmunds, Wroxall, Isle of Wight, sent Carnations.

W. Armitage, Esq., Cleckheaton, sent Carnations.

Mr. B. G. Rowntree, Norton-on-Tees, staged Carnations.

Messrs. Gleeson, Watford, brought Pelargonium 'Golden Jacoby.'

Sir Trevor Lawrence, Bart., V.M.H., Burford, Dorking, sent *Impatiens Oliveri*.

Mr. A. W. Child, Belfast, sent Carnations.

Messrs. Stevens, Coventry, brought Pelargonium 'Queen of England.'

Messrs. F. Carter, Woking, staged Dahlias.

Harry J. Veitch, Esq., East Burnham Park, Slough, sent *Koelreuteria paniculata*.

H. T. Pitt, Esq., Stamford Hill, sent Dahlias.

C. E. Wilkins, Esq., South Croydon, sent Pelargonium 'Mrs. C. E. Wilkins.'

Mr. A. D. Gwillim, New Eltham, staged Begonias and Gloxinias.

Messrs. Hobbies, Dereham, brought Dahlias.

Mr. G. Reuthe, Keston, Kent, sent hardy flowers.

Mr. L. R. Russell, Richmond, staged Crotons.

Messrs. Low, Bush Hill Park, staged Chironias.

Messrs. Stredwick, St. Leonards-on-Sea, brought Dahlias.

Messrs. Barr, Covent Garden, sent hardy flowers.

Mr. H. Henkell, Darmstadt, brought *Abies arizonica* var. *argentea*.

FLORAL COMMITTEE, SEPTEMBER 11, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and nineteen members present.

Awards Recommended:—

Gold Medal.

To Messrs. Carter Page, 52 London Wall, E.C., for Dahlias.

Silver-gilt Banksian Medal.

To Messrs. Hill, Edmonton, for Ferns.

Silver Flora Medal.

To Messrs. Cutbush, Highgate, for herbaceous flowers.

To Messrs. Gunn, Birmingham, for Phloxes.

To Messrs. Hobbies, Dereham, for Dahlias.

To Mr. J. E. Knight, Wolverhampton, for Dahlias.

To Mr. A. Perry, Winchmore Hill, N., for hardy flowers.

Silver Banksian Medal.

To Messrs. Cannell, Swanley, for annuals and Dahlias.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Paul, Cheshunt, for shrubs.

To Messrs. Veitch, Chelsea, for Leonotis and Croweas.

Bronze Flora Medal.

To Mr. L. R. Russell, Richmond, for Clematises.

To Messrs. Ware, Feltham, for hardy flowers.

Award of Merit.

To Chrysanthemum 'Ethel' (votes, 13 for), from Messrs. Wells, Merstham. An early flowering reflexed variety of moderate size and good form, and a pleasing canary-yellow shade of colour.

To Dahlia 'Gazelle' (votes, 9 for, 4 against), from Messrs. Stredwick, St. Leonards-on-Sea. A Cactus variety of medium size, with pretty incurved florets and a mauve colour with a white centre. A charming variety.

To Dahlia 'Rev. A. Hall' (votes, 13 for), from Messrs. Stredwick. A Cactus variety with long fluted florets of a pale crimson colour.

To Dahlia 'Hamlet' (votes, 9 for, 3 against), from Messrs. Carter, Woking. A Cactus variety, with a medium-sized handsome flower of a brilliant red colour.

Other Exhibits.

Messrs. Barr, Covent Garden, staged hardy flowers.

Mr. A. J. Climpson, Harpenden, brought Coleuses.

Mr. B. Ladhams, Southampton, staged Lobelias.

Messrs. Laing, Forest Hill, sent Crotons.

Mr. G. Reuthe, Keston, brought hardy flowers.

Mr. D. Russell, Brentwood, staged Ericas.

Messrs. Wallace, Colchester, sent hardy flowers.

Messrs. Wells, Merstham, brought Early Chrysanthemums.

Messrs. Peed, West Norwood, staged alpine plants.

Messrs. Low, Bush Hill Park, sent Carnations.

Rev. E. A. Edgell, Lodsworth Vicarage, sent Dahlias.

Mr. J. T. West, Brentwood, brought Dahlias.

Mr. S. Mortimer, Farnham, staged Dahlias.

Sir E. Loder, Bart., Leonardslee, Horsham (gr. Mr. Cook), sent *Tecoma grandiflora*.

FLORAL COMMITTEE, SEPTEMBER 25, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended:—*Silver-gilt Flora Medal.*

To Messrs. Baker, Wolverhampton, for Dahlias.

To Messrs. Carter Page, London Wall, for Dahlias.

To Messrs. Hill, Edmonton, for *Asplenium nidus-avis*.

To Messrs. Ware, Feltham, for Dahlias.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Dahlias.

To Messrs. Cheal, Crawley, for Dahlias.

To J. C. Fordy, Esq., Warkworth, Northumberland, for Gladioli.

To Messrs. Hobbies, Dereham, for Dahlias.

To Messrs. May, Edmonton, for Veronicas and Hardy Ferns.

To Mr. S. Mortimer, Farnham, for Carnations.

To Messrs. Paul, Waltham Cross, for Roses.

To Messrs. Turner, Slough, for Dahlias.

Silver Banksian Medal.

To Mr. L. R. Russell, Richmond, for Clematises and Celosias.

To Messrs. J. Veitch, Chelsea, for miscellaneous plants.

First-class Certificate.

To *Asplenium laceratum* (votes, 9 for), from Messrs. Hill. A form of *A. nidus-avis*, with fronds very much divided on each side of the midrib, giving the foliage a curious and attractive effect. The habit is exactly the same as *A. nidus-avis*.

Award of Merit.

To Dahlia 'Rodney' (votes, unanimous), from Messrs. Turner, Slough. A Pompon variety of medium size and perfect form. The colour is a rich buff or amber.

To Dahlia 'Portia' (votes, unanimous), from Messrs. Turner. Another Pompon of perfect form and slightly over the average size. Colour a lovely mauve.

To Dahlia 'Ruby Grinstead' (votes, unanimous), from Messrs. Stredwick, St. Leonards-on-Sea. A splendid Cactus variety of excellent shape and a charming shade of fawn, flushed with pink, and shading to orange at the base of the petals.

To Dahlia 'Sunshine' (votes, unanimous), from Messrs. Stredwick. Another very fine Cactus variety of perfect shape and a brilliant red colour.

To Dahlia 'Hyacinth' (votes, unanimous), from Messrs. Stredwick. A Cactus variety of excellent form and a rosy bronze colour, each petal shading to bronze at the base.

To Dahlia 'Meteor' (votes, unanimous), from Messrs. Stredwick. A curious Cactus variety, the whole being a mingling of deep crimson and white.

To Dahlia 'Daisy Staples' (votes, unanimous), from Messrs. Carter, Woking. A lovely pink Cactus variety of exquisite form.

To Dahlia 'Kitty' (votes, unanimous), from Messrs. Cheal, Crawley. A single variety of a pretty mauve colour with a crimson zone at the base.

Other Exhibits.

Messrs. Barr, Covent Garden, staged hardy flowers.

Messrs. Blackmore and Langdon, Bath, brought tuberous Begonias.

Messrs. Bunyard, Maidstone, sent *Physalis Bunyardi*.

Messrs. Cutbush, Highgate, staged hardy flowers.

Mr. A. D. Gwillim, New Eltham, sent Begonias.

Messrs. Paul, Cheshunt, brought flowering shrubs.

Messrs. Peed, Streatham, sent Begonias.

Mr. G. Reuthe, Keston, staged hardy flowers.

Messrs. Wells, Merstham, sent Chrysanthemums.

Mr. J. T. West, Brentwood, brought Dahlias.

Messrs. Brown, Peterborough, staged Roses and Clematises.

Messrs. Smith, Worcester, sent shrubs.

Mr. G. H. Sage, Richmond, sent Asters.

Messrs. Lowe, Bush Hill Park, staged Carnations.

Mr. W. H. Divers, Belvoir Castle Gardens, brought Dahlia
'Pompadour.'

A. A. Kerridge, Esq., Chippenham, sent Dahlias.

Messrs. Keynes-Williams, Salisbury, sent Dahlias.

Mr. Kempshall (gr. to Lady Ilchester, Abbotsbury) sent *Chilianthus
oleaceus*.

Hugh Kerr, Esq., Ardgowan, South Woodford, sent Begonia 'Hugh
Gemmell,' which the Committee desired to see again.

Mrs. Stewart McKenzie, Lydhurst, Hayward's Heath, sent a very fine
plant of *Kentia belmoreana*.

Mr. A. Perry, Winchmore Hill, sent hardy flowers.

Leopold de Rothschild, Esq., Gunnersbury House, Acton (gr. Mr.
Hudson, V.M.H.), sent *Clivia cyrtanthiflora*.

H. P. Sturges, Esq., Givons, Leatherhead (gr. Mr. Peters), staged
Asters, which the Committee wished sent to Wisley.

E. Ballard, Esq., The Court, Colwall, sent Asters, which the Committee
wished tried at Wisley.

FLORAL COMMITTEE, OCTOBER 9, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended:—

Gold Medal.

To Messrs. Hill, Edmonton, for Ferns.

Silver-gilt Flora Medal.

To Messrs. Rochford, Turnford Hall, Herts, for Crotons and
Nephrolepis.

Silver-gilt Banksian Medal.

To Messrs. Cutbush, Highgate, for Carnations and hardy flowers.

To Messrs. Hobbies, Dereham, for Dahlias and Roses.

To Mr. G. Prince, Longworth, Berks, for Roses.

Silver Flora Medal.

To Messrs. Cannell, Swanley, for Dahlias.

To Messrs. Cragg, Harrison & Cragg, Heston, for Chrysanthemums &c.

Silver Banksian Medal.

To Mr. F. Brazier, Caterham, for hardy flowers.

To Messrs. Carter Page, London Wall, E.C., for Dahlias and Chrysanthemums.

To Messrs. Cheal, Crawley, for Dahlias and shrubs.

To Messrs. Low, Enfield, for Carnations, Ericas, &c.

To Messrs. May, Edmonton, for Bouvardias and Ferns.

To Messrs. Peed, Streatham, for Begonias.

To Mr. L. R. Russell, Richmond, for Ivies.

To Messrs. Wells, Merstham, for Chrysanthemums

Bronze Flora Medal.

To Mr. J. Buckhaus, Twickenham, for Crotons.

To Mr. R. C. Notcutt, Woodbridge, for hardy flowers.

First-class Certificate.

To *Nephrolepis todeoides* (votes, unanimous), from Messrs. Rochford, Turnford Hall. A beautiful variety of elegant habit, with foliage almost like the fronds of *Todea superba*. Each frond being so much divided and plumose makes this variety exceptionally decorative. It originated as a sport from *N. elegantissima*.

Award of Merit.

To Carnation 'Mrs. Robert Norman' (votes, 15 for, 1 against), from Messrs. Cutbush, Highgate. A tree variety with large pure white fragrant blooms, of good form and perfect calyx.

To Nerine 'Crimson King' (votes, unanimous), from Mr. H. Elliott, Hassocks, Sussex. A large-flowered glowing crimson variety with broad recurving petals.

To *Colchicum Bivona superbum* (votes, unanimous), from Messrs. Barr, Covent Garden. Flowers very large and good substance, rich purple shading to white at the centre.

To Rose 'Nellie Johnstone' (votes, unanimous), from Messrs. Paul, Cheshunt. A charming 'Tea' variety with flowers of medium size, good shape, and a beautiful pink colour.

Other Exhibits.

Mr. R. Bolton, Carnforth, staged excellent Sweet Peas.

Messrs. Bull, Chelsea, brought Dracænas.

Miss M. H. Dodge, Losely Park, Guildford, sent Chrysanthemums.

Mr. G. Reuthe, Keston, brought hardy flowers.

Miss Willmott, V.M.H., Warley Place, Brentwood, sent Nerines.

Mr. E. F. Such, Maidenhead, staged Chrysanthemums.

Mary, Countess of Ilchester, Holland House, sent Ipomoeas.

Messrs. Heath, Cheltenham, brought Carnations.

Mr. H. J. Jones, Lewisham, staged Chrysanthemum 'Tapis de Neige.'

R. Marshall, Esq., Castlecary, Glasgow, sent Chrysanthemums.

Mr. F. Cozens, Rownham, Southampton, sent Dahlias.

FLORAL COMMITTEE, OCTOBER 23, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-six members present.

Awards Recommended:—*Silver-gilt Flora Medal.*

To Lord Aldenham, Elstree, Herts (gr. Mr. Beckett, V.M.H.), for tree and shrub foliage.

To Mr. H. J. Jones, Lewisham, for Chrysanthemums.

To Messrs. J. Veitch, Chelsea, for Nepenthes, Begonias, and Chrysanthemums.

Silver-gilt Banksian Medal.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums &c.

To Messrs. Hill, Edmonton, for Ferns.

Silver Flora Medal.

To Messrs. Wells, Merstham, for Chrysanthemums.

Silver Banksian Medal.

To Mr. F. Brazier, Caterham, for hardy flowers.

To Messrs. Hobbies, Dereham, for Dahlias.

To Messrs. May, Edmonton, for Crotons.

To Mr. S. Mortimer, Farnham, for Carnations.

Bronze Flora Medal.

To Messrs. Peed, Streatham, for Chrysanthemums.

Bronze Banksian Medal.

To Messrs. R. Smith, Worcester, for shrubs.

Award of Merit.

To Chrysanthemum 'Algernon Davis' (votes, unanimous), from Mr. W. J. Godfrey, Exmouth, and Mr. Norman Davis, Framfield. A reflexed Japanese variety of rather large size, good depth, and a beautiful buttercup-yellow colour. A very handsome flower.

To Chrysanthemum 'Mrs. Norman Davis' (votes, unanimous), from Mr. Norman Davis. A large pure white reflexed Japanese flower with long narrow florets. A fine exhibition variety.

To Chrysanthemum 'Mrs. A. T. Miller' (votes, unanimous), from Mr. H. J. Jones, Lewisham, and Mr. W. J. Godfrey, Exmouth. Flower of immense size and of the Japanese section. The colour is pure white, and the flower of great depth and width.

To Chrysanthemum 'Dora Godfrey' (votes, 16 for), from Mr. W. J. Godfrey. A single variety with pale canary-yellow flowers of moderate size and freely produced.

To *Nerine flexuosa alba* (votes, 15 for, 5 against), from Messrs. Barr, Covent Garden. A pure white form of *N. flexuosa*, similar in all points except in colour. It received a botanical certificate October 21, 1902.

To Carnation 'White Perfection' (votes, unanimous), from Messrs. Low, Enfield, and Mr. A. F. Dutton, Iver. A fine winter-flowering variety, with good pure white flowers with slightly fringed petals.

To Carnation 'Robert Craig' (votes, 17 for, 1 against), from Messrs. Low, Messrs. Cutbush, Highgate, and Mr. A. F. Dutton. A brilliant crimson-flowered tree variety with a deliciously scented, fine-formed flower, very freely produced.

To Begonia 'Elatior' (votes, unanimous), from Messrs. J. Veitch, Chelsea. Raised from a tuberous variety $\times B. socotrana$. Plants very dwarf and compact in habit. Flowers a rich rosy-crimson, semi-double, and of large size. A valuable winter-flowering variety.

To *Vitis armata Veitchii* (votes, unanimous), from Messrs. J. Veitch, Chelsea. A new hardy ornamental variety from Central China. The autumn foliage is a dark red colour, suffused with purple and of a sufficiently large size to give a fine bold effect. The young wood and petioles are studded with prickles.

To *Nephrolepis cordata tessellata* (votes, 13 for), from Messrs. Prickett, South Tottenham. A very curious variety of the type, the pinnae becoming pinnate at the point, giving the plant a curious and yet decorative appearance.

Other Exhibits.

Messrs. Barr, Covent Garden, staged hardy flowers.

Messrs. Cragg, Harrison & Cragg, Heston, sent Cacti.

Messrs. Cutbush, Highgate, brought Carnations.

Messrs. Paul, Waltham Cross, sent Roses &c.

Mr. L. R. Russell, Richmond, staged Aucubas.

Messrs. Stark, Great Ryburgh, brought Sweet Peas and Tropæolums.

Messrs. Low, Enfield, sent Carnations &c.

Mr. G. Mileham, Leatherhead, staged Chrysanthemums.

Messrs. Heath, Cheltenham, sent Carnations.

Mr. H. Perkins, Henley-on-Thames, brought Chrysanthemums.

Mr. F. W. Moore, V.M.H., Glasnevin, sent Nerines.

J. Blow, Esq., Lavington, staged Chrysanthemums.

FLORAL COMMITTEE, NOVEMBER 6, 1906.

Mr. H. B. MAY in the Chair, and nineteen members present.

Awards Recommended :—

Gold Medal.

To Messrs. May, Edmonton, for Ferns.

To Messrs. J. Veitch, Chelsea, for stove and greenhouse plants.

Silver-gilt Flora Medal.

To Messrs. Cutbush, Highgate, for miscellaneous plants.

Silver Flora Medal.

To Messrs. Low, Bush Hill Park, for Carnations.

Bronze Flora Medal.

To Mr. G. Reuthe, Keston, Kent, for Nerines and Crocuses.

To Messrs. Wells, Merstham, for Chrysanthemums.

Award of Merit.

To *Chrysanthemum* 'Mrs. Brewster' (votes, 10 for, 3 against), from Mr. D. Fairweather, Bifrons, Canterbury. Flowers semi-double, deep bronze, with a yellow ring round the disc. A very fine decorative variety.

To *Chrysanthemum* 'Glitter' (votes, unanimous), from Messrs. Wells. A reflexed variety with medium-sized flowers of a deep yellow colour. A good decorative variety.

To *Chrysanthemum* 'Buttercup' (votes, unanimous), from Messrs. Wells. An incurved variety, of large size and good form, and a rich yellow colour.

To *Crocus Boryi* var. *marathonisius* (votes, unanimous), from Mr. G. Reuthe, Keston. Flowers pure white, with a yellow base to each petal. The flower is over three inches across, with a bright red stigma, giving it a most effective appearance.

To *Capsicum annuum* 'Celestial' (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, Woodford (gr. Mr. Davis). The fruit is of medium size and deep red when ripe, but until ripe the fruits are white, giving the plant a curious and very decorative appearance.

Other Exhibits.

Mr. E. Engelmann, Saffron Walden, brought Sweet Peas.

A. Kingsmill, Esq., The Holt, Harrow Weald, sent exceedingly fine *Pernettyas*.

Messrs. Peed, Streatham, staged alpine plants.

Mr. L. R. Russell, Richmond, brought Aucubas.

Messrs. R. Smith, Worcester, staged choice shrubs.

Mr. G. H. Sage, Richmond, sent Violets.

Mr. J. Baldock, Cranbrook, brought *Chrysanthemums*.

T. F. Harrison, Esq., Hitchin, sent Carnations.

Mr. H. Perkins, Henley-on-Thames, sent *Chrysanthemums*.

Mr. Seward, Hanwell, staged *Chrysanthemums*.

Leopold de Rothschild, Esq., Ascot, sent *Callicarpa purpurea*.

G. Ferguson, Esq., The Hollies, Weybridge, sent *Chrysanthemums*.

 FLORAL COMMITTEE, NOVEMBER 20, 1906.

Mr. W. MARSHALL, V.M.H., in the Chair, and twenty-eight members present.

Awards Recommended:—*Silver-gilt Flora Medal.*

To Messrs. Cutbush, Highgate, for Conifers &c.

Silver-gilt Banksian Medal.

To Mrs. Stewart Mackenzie, of Seaforth, Lydhurst, Hayward's Heath (gr. Mr. Smith), for Begonias.

Silver Flora Medal.

To the Hon. Walter Rothschild, Tring Park (gr. Mr. Dye), for Begonias.

To E. H. Brown, Esq., Highwood, Roehampton (gr. Mr. Bradford), for miscellaneous plants.

To Messrs. Cannell, Swanley, for Pelargoniums and Chrysanthemums.

To Messrs. Cragg, Harrison & Cragg, Heston, for Chrysanthemums.

Silver Banksian Medal.

To Lord Aldenham, Elstree (gr. Mr. Beckett, V.M.H.), for Chrysanthemums.

To Messrs. Jeffries, Cirencester, for Conifers.

To Messrs. Low, Bush Hill Park, for Carnations &c.

To Messrs. May, Edmonton, for flowering plants.

Bronze Flora Medal.

To J. H. Hooper, Esq., Snowdenham Hall, Bramley (gr. Mr. Joy), for Cyclamens.

Award of Merit.

To Chrysanthemum 'Madame R. Oberthur' (votes, 19 for, 1 against), from Mr. Norman Davis, Framfield. A Japanese variety of large size, fine form, and pure white colour.

To Chrysanthemum 'Madame G. Rivol' (votes, unanimous), from Mr. Norman Davis and Messrs. Wells, Merstham. A remarkably fine incurved Japanese flower, of large size and fine quality, and a pleasing yellow colour.

To Chrysanthemum 'Mrs. Sidney Fox' (votes, 17 for, 2 against), from Mr. D. Fairweather, Bifrons, Canterbury. A very large Japanese flower, of a rich pink colour and great width.

To Chrysanthemum 'Edith Harling' (votes, unanimous), from Messrs. Wells. A very pretty single variety of a pale yellow colour.

To Chrysanthemum 'Merstham White' (votes, unanimous), from Messrs. Wells. A very large single variety, with several rows of florets and a charming white colour. A very effective variety.

To Chrysanthemum 'H. Hearn' (votes, 16 for), from Mr. W. Seward, The Beeches, Hanwell. A beautiful incurved variety of large size and fine form. The colour is red, shading to old gold or bronze with a paler reverse.

To Chrysanthemum 'Miss H. Hampson' (votes, 15 for, 6 against), from Lord Aldenham. A pure white single variety, evidently a profuse bloomer.

Other Exhibits.

Mr. H. J. Jones, Lewisham, staged Chrysanthemums.

Mr. G. Kent, Norbury Park Gardens, Dorking, brought Chrysanthemums.

Messrs. Peed, Streatham, staged alpine plants.

Mr. G. Reuthe, Keston, sent bulbous plants.

Mr. L. R. Russell, Richmond, staged ornamental shrubs.

F. M. Hampden Turner, Esq., Rooksnest, Godstone (gr. Mr. Penton), sent Begonias and Pelargoniums.

Messrs. J. Veitch, Chelsea, brought Begonias &c.

Messrs. Wells, Merstham, staged Chrysanthemums.

J. Courtney, Esq., J.P., Weybridge, sent Chrysanthemums.
 Mr. W. H. Divers, Belvoir Castle Gardens, sent Chrysanthemums.
 Mr. R. C. West, St. Mark's, Cheltenham, brought Chrysanthemums.
 Mr. W. Howe, Park Hill, Streatham, staged Chrysanthemums.
 Messrs. Heath, Cheltenham, staged Carnations.
 Mr. E. P. Cooper, Muswell Hill, sent Chrysanthemums.
 G. Ferguson, Esq., Weybridge, sent Chrysanthemums.
 Mr. J. C. Russell, Taunton, brought Chrysanthemums.
 Mr. C. Parslow, Thetford, staged Chrysanthemums.
 Mr. C. Carpenter, West Hall Gardens, Byfleet, sent Chrysanthemums.
 Mr. H. Stickley, Crouch Hill, brought Chrysanthemums.

FLORAL COMMITTEE, DECEMBER 11, 1906.

Mr. H. B. MAY in the Chair, and twenty-three members present.

Awards Recommended :—

Silver Flora Medal.

To F. A. Bevan, Esq., Trent Park, New Barnet (gr. Mr. Parr), for Begonias.

To Messrs. J. Waterer, Bagshot, for Conifers &c.

Silver-gilt Flora Medal.

To E. H. Brown, Esq., Highwood, Roehampton (gr. Mr. Bradford), for Begonias and Poinsettias.

To Messrs. Cannell, Swanley, for Zonal Pelargoniums.

To Messrs. J. Veitch & Sons, Chelsea, for Begonias &c.

Silver Banksian Medal.

To Messrs. Cutbush, Highgate, for Orange Trees.

To Mr. H. Burnet, Guernsey, for Carnations.

Other Exhibits.

Messrs. Low, Bush Hill Park, staged Carnations &c.

Major Nelson George, Lowfield Heath, sent Begonias.

Messrs. Peed, Streatham, brought alpine plants.

Mr. L. R. Russell, Richmond, sent Aucubas.

Lady Salisbury, Hatfield, sent Cyclamen and Poinsettias.

Messrs. Wells, Merstham, staged Chrysanthemums.

Mr. D. Manning, Salisbury, sent Chrysanthemum 'Mrs. G. D. Manning.'

Messrs. Maurice, Guernsey, sent Carnation 'Louise Michel.'

Mr. A. Nobbs, Hayward's Heath, brought Chrysanthemum 'Annie.'

FRUIT AND VEGETABLE COMMITTEE.

JANUARY 9, 1906.

Mr. J. CHEAL in the Chair, and fourteen members present.

Awards Recommended :—

Hogg Memorial Medal.

To Messrs. Bunyard, Maidstone, for 100 dishes of Apples and Pears.

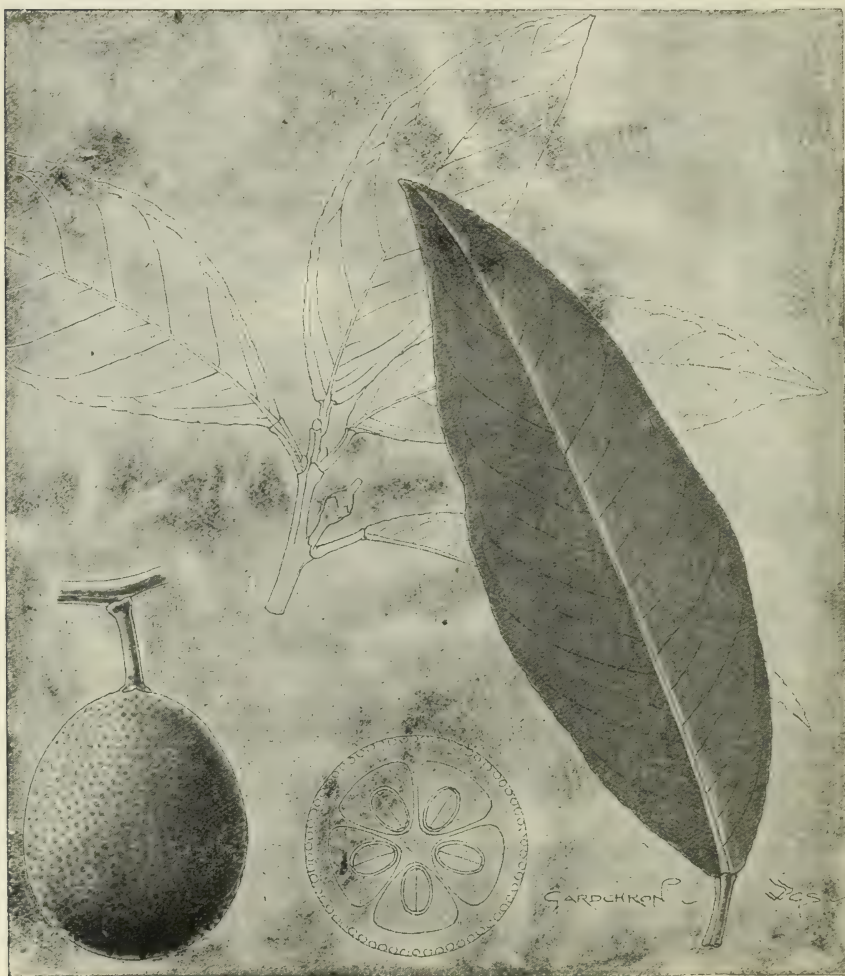


FIG. 58.—CITRUS JAPONICA WITH ELLIPTIC FRUIT. (*Gardeners' Chronicle.*)

Silver-gilt Banksian Medal.

To Sir E. G. Loder, Bart., Leonardslee, Horsham (gr. Mr. Cook), for sixty dishes of Apples and Pears.

To W. Shuter, Esq., 22 Belsize Grove, Hampstead, for 'Black Alicante' Grapes.

First-class Certificate.

To *Citrus japonicus* var. *fructu elliptico* (votes, unanimous), from Messrs. J. Veitch, Chelsea. Fruit small, bright-yellow, oval, borne in great profusion on small plants; flesh firm and very pleasantly acid; rind thin and of a pleasing flavour; an excellent dessert variety and most ornamental. An Award of Merit was given this variety as a decorative plant on December 19, 1905.

Cultural Commendation.

To Mr. E. Beckett (gr. to Lord Aldenham, Elstree), for two dishes of exceedingly fine Mushrooms.

Other Exhibits.

Messrs. Cross, Wisbech, staged three dishes of Apples.

Mr. F. Braby, Bushey Lodge, Teddington, sent Apple 'Fitzwater's Seedling.'

Captain Purefoy, R.N., Shalstone Manor, Bucks, sent an unnamed seedling Apple, not equal to many in cultivation.

Messrs. Massey, Spalding, brought thirty-two dishes of Potatoes.

Mr. Tallack, Shipley Hall Gardens, Derby, sent Apple 'Honeysop.'

It was unanimously decided that a vote of sympathy be sent to Mrs. Harrison Weir, Poplar Hall, Appledore, Kent, on the death of her husband, who was for many years a valuable member of this Committee.

FRUIT AND VEGETABLE COMMITTEE, JANUARY 23, 1906.

Mr. A. H. PEARSON in the Chair, and thirteen members present.

Awards Recommended :—

Silver Knightian Medal.

To the Dowager Lady Hillingdon, Wildernes Park, Sevenoaks, for forty dishes of Apples and Pears.

Cultural Commendation.

To Mr. C. Foster, University College, Reading, for forced Dandelion and Chicory.

FRUIT AND VEGETABLE COMMITTEE, FEBRUARY 13, 1906.

Mr. A. H. PEARSON in the Chair, and twenty-four members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading, for a splendid collection of Potatoes. There were about 150 dishes, including many species. Specially noticeable were *Solanum tuberosum*, *S. Maglia*, *S. Commersoni*, *S. polyadenium*, and others.

Silver Knightian Medal.

To Mrs. Dennison, Little Gaddesden, Berkhamstead (gr. Mr. Seattle), for thirty dishes of Potatoes.

Silver Banksian Medal.

To Mrs. MacCreagh-Thornhill, Stanton-in-Peak, Bakewell, for exceedingly fine Oranges and Lemons.

To S. C. Raphael, Esq., Castle Hill, Englefield Green, for six bunches of 'Black Alicante' Grapes.

Other Exhibits.

Sir F. E. Astley-Corbett, Bart., Elsham Hall, Lincoln (gr. Mr. Gardner), sent Apple 'Elsham Seedling.'

J. Garland, Esq., Broadclyst, Exeter, sent Apple 'Star of Devon.'

Col. Brymer, Islington House, Dorchester, sent Pear 'Santa Claus,' of large size and delicious flavour.

Mr. B. Wright, Lyndon, Oakham, staged Apple 'Rodger John Edward Conant.'

Col. Archer Houblon, Welford Park, Newbury, brought Apples 'Encore' and 'Dux.'

Messrs. Bunyard, Maidstone, staged Apple 'St. Valentine,' past its best.

Mr. G. H. Sage, 71 Manor Road, Richmond, sent Apple 'W. Chappell.'

Mrs. Rolls Hoare, West Grinstead Park, Horsham, sent a dish of Apples named 'Bull's Golden Reinette,' which proved to be 'Beachamwell.'

B. Martin, Esq., New House, Buxted, sent Apple 'Martin's Pearmain.'

Mr. A. Andrews, High House Gardens, Campsea Ash, sent Apple 'Hon. W. Lowther,' syn. 'Pigeonnet,' also D'Arcy Spice, a fine-flavoured variety, but succeeding in only a few places.

Mr. A. Dean, V.M.H., 62 Richmond Road, Kingston-on-Thames, brought Apple 'Annie Elizabeth,' in perfect condition.

FRUIT AND VEGETABLE COMMITTEE, MARCH 6, 1906.

Mr. A. H. PEARSON in the Chair, and twenty-six members present.

Award Recommended :—

Silver Banksian Medal.

To J. B. Fortescue, Esq., Dropmore, Maidenhead (gr. Mr. Page), for thirty-six dishes of Apples and Pears.

Other Exhibits.

Mr. J. Crook, Forde Abbey Gardens, Chard, sent forced French Beans.

Mr. Foster, University College, Reading, staged Chicory.

Mr. Wythes, V.M.H., Syon Gardens, Brentford, sent Tomato 'Sunrise.'

Mr. A. H. Pearson proposed that a vote of condolence be sent to Mrs. and Miss Norman on the death of Mr. Norman, V.M.H., late head gardener

to the Marquis of Salisbury, Hatfield, and for many years a valuable member of this Committee. This was endorsed by Messrs. Cheal, Lyne, Thomas, Beckett, and Millard, who all spoke feelingly of the great loss to the Committee and to horticulture sustained by the death of Mr. Norman.

FRUIT AND VEGETABLE COMMITTEE, MARCH 20, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To King's Acre Nursery Co., Hereford, for a collection of Apples.

To Messrs. Rivers, Sawbridgeworth, for Oranges and Lemons.

Award of Merit.

To New Fruit Bottle (votes unanimous), from the French Flint Glass Bottle Co., Aldersgate Street, E.C. This is the best bottle we have seen for bottling fruit, as the cap is glass instead of metal, fitting on to a rubber ring, and is kept tight and in place by another cap, which screws on the top of the bottle. In this way the fruit is perfectly air-tight, and will keep sound for an indefinite period.

Cultural Commendation.

To Mr. Cook (gr. to Sir E. G. Loder, Bart., Leonardslee, Horsham), for Broccoli.

Other Exhibit.

Mr. P. Le Cornu, Queen's Road, Jersey, sent fruit of Apple 'Jersey Beauty,' a very handsome variety, but not of good flavour.

FRUIT AND VEGETABLE COMMITTEE, APRIL 3, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Exhibits.

Miss Hermon, Douglas Lodge, Surbiton, sent an unnamed Apple of no special merit.

Messrs. Poupart, Twickenham, brought Rhubarb 'Daw's Champion,' a very valuable early variety.

Messrs. Philips, 4 Fenchurch Buildings, E.C., staged West Indian Gourds.

Mr. T. Barefoot, Alpha Cottage, Mortimer, sent a seedling Apple past its best.

FRUIT AND VEGETABLE COMMITTEE, APRIL 17, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and twelve members present.

Awards Recommended :—

Award of Merit.

To Broccoli 'Richmond Late White' (votes, unanimous), from Messrs. Hurst, Houndsditch, E.C. A very fine white firm head, of medium size, good shape, and well protected by its own foliage.

To Broccoli 'Late Queen' (votes, 8 for), from Messrs. Sutton, Reading. This excellent late Broccoli is so well known and universally grown that any description is superfluous. A fine, even stock.

Cultural Commendation.

To Messrs. Paul, Cheshunt, for a fruiting plant in a pot of *Eriobotrya japonica*, or Japanese Medlar.

Other Exhibits.

Col. R. W. Williams, M.P., Bridehead, Dorchester, sent Apple 'Bridehead Reliance,' somewhat similar to 'Tower of Glamis.'

T. W. Sanders, Esq., 124 Embleton Road, Lewisham, S.E., sent Apple 'Martin's Late Beauty,' past its best.

FRUIT AND VEGETABLE COMMITTEE, MAY 1, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty-five members present.

Award Recommended :—

Silver Banksian Medal.

To W. M. Bullivant, Esq., Homewood, Eden Park, Beckenham, for a box of very large 'Royal Sovereign' Strawberries.

FRUIT AND VEGETABLE COMMITTEE, MAY 15, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Messrs. Rivers, Sawbridgeworth, for Peach trees in fruit.

To Messrs. J. Veitch, Chelsea, for a collection of Apples.

Silver Banksian Medal.

To Lady Plowden, Aston Rowant, Oxon., for Strawberries.

To Lord Aldenham, Elstree (gr. Mr. E. Beckett, V.M.H.), for Lettuce.

Award of Merit.

To Broccoli 'Peerless' (votes, 9 for), from Messrs. Kent & Brydon, Darlington. A very dwarf, sturdy variety, with a small spread of leaves and pure white handsome heads of moderate size, and very solid.

Other Exhibits.

Mr. Metcalfe, Luton Hoo Gardens, Beds, brought Lettuce 'Grand Admiral.'

The Horticultural College, Swanley, sent Cucumbers.

Mr. S. Mortimer, Rowledge, Farnham, staged Tomatoes.

Mr. E. Beckett, V.M.H., Aldenham House Gardens, Elstree, brought Tomatoes.

FRUIT AND VEGETABLE COMMITTEE, JUNE 12, 1906.

Mr. J. CHEAL in the Chair, and eighteen members present.

Exhibits.

Mr. S. Mortimer, Rowledge, Farnham, staged Cucumber 'Bounteous.'

W. E. Neal, The Gardens, Tilgate, Crawley, sent a Melon, which the Committee desired to see again.

Mr. H. Parr, Trent Park Gardens, New Barnet, brought two varieties of Melons not quite ripe. The Committee asked to see them again.

Messrs. Paul, Cheshunt, sent Cherry 'Frühste der Mark,' grown in the open air. The fruit was of medium size, fine, dark-red colour, but of inferior flavour, and, though not good enough for dessert, may prove valuable for cooking.

FRUIT AND VEGETABLE COMMITTEE, JUNE 26, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and sixteen members present.

Award Recommended :—

Cultural Commendation.

To Mr. C. Foster, University College, Reading, for six dishes of Peas.

Other Exhibits.

Miss Violet Fellowes, Shotesham Park, Norwich, sent Melon 'Shotesham Park Favourite.'

Miss M. H. Dodge, Losely Park, Guildford, sent a small collection of Vegetables.

Messrs. Bath, Wisbech, brought Strawberry 'Kentish Favourite.'

Mr. Stepney, Warren House Gardens, Kingston Hill, staged a variety of Peas named 'Partridge Pea.'

FRUIT AND VEGETABLE COMMITTEE, JULY 17, 1906.

Mr. A. H. PEARSON in the Chair, and twelve members present.

Awards Recommended :—

Gold Medal.

To Lord Aldenham, Elstree, Herts (gr. Mr. E. Beckett, V.M.H.), for a superb collection of Vegetables.

Hogg Medal.

To Lord Hillingdon, Hillingdon Court, Uxbridge (gr. Mr. Allan), for a collection of Fruit.

Award of Merit.

To Raspberry 'Norwich Wonder' (votes, 9 for), from Mr. Cook, gr. to Sir E. G. Loder, Bart., Leonardslee, Horsham. This excellent Raspberry is a dwarf sturdy grower, a great bearer, with fruit of medium size, fine dark-red colour, and one of the best for market or private use.

Cultural Commendation.

To Mr. Cuckney, gr. to the Earl of Darnley, Cobham Hall, for Peach 'Condor.'

Other Exhibits.

Mr. Carter, gr. to Mrs. Neville Grenville, Butleigh Court, Glastonbury, sent a Melon named 'Butleigh Court,' too much like 'Sutton's Scarlet' to be considered distinct.

Mr. J. F. Strang, St. Saviour's, Jersey, sent Cherry 'Logie,' which arrived in bad condition.

Mr. F. Summers, Sonning, brought Cucumbers and Potatoes.

Messrs. J. Carter, High Holborn, staged Pea 'Quite Content,' raised from Edwin Beckett × Alderman, a variety with very large pods.

Mr. W. Deal, Brooklands, Kelvedon, staged a collection of culinary Peas.

FRUIT AND VEGETABLE COMMITTEE, JULY 31, 1906.

Mr. J. CHEAL in the Chair, and seventeen members present.

Exhibits.

Mary Countess of Ilchester, Holland House, Kensington (gr. Mr. Dixon), sent some very fine 'Early Albert' Peaches. This variety is distinct from 'Early Alfred,' with which it is often confused.

Messrs. Spooner, Hounslow, staged Apple 'Early Red Margaret,' a very old variety.

Mr. E. Beckett, V.M.H., gr. to Lord Aldenham, Elstree, sent Carrot 'Blood Red' and Pea 'Quite Content,' which the Committee wished tried at Wisley next year.

FRUIT AND VEGETABLE COMMITTEE, AUGUST 14, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and fourteen members present.

Awards Recommended :—

Hogg Medal.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for collection of Fruit.

Silver-gilt Knightian Medal.

To Leopold de Rothschild, Esq., Gunnersbury Park (gr. Mr. Reynolds), for exceedingly fine Peaches grown on pot trees.

Silver-gilt Banksian Medal.

To Mrs. F. A. Brace, Doveridge Hall, Derby (gr. Mr. Wadeson), for a collection of Fruit.

To the Horticultural College, Swanley, for a collection of Fruit.

Silver Banksian Medal.

To Messrs. Spooner, Hounslow, for a collection of Apples.

First-class Certificate.

To Pea 'Quite Content' (votes, unanimous), from Mr. Beckett, V.M.H., gr. to Lord Aldenham, Elstree, raised from Alderman \times Edwin Beckett. A very fine variety that combines all the good qualities of both parents, a great bearer, and of excellent flavour.

Other Exhibits.

Messrs. Low, Bush Hill Park, staged Fig Trees in pots.

Mr. R. Smith, Brickendonbury, Hereford, sent Apple 'Smith's Early,' which the Committee wished a deputation to see growing.

Mr. J. Barrance, New Barnet, brought Cucumber 'Barrance's Prolific.'

Mr. Stepney, Warren House Gardens, Kingston Hill, sent Melon 'Stepney's Seedling.'

FRUIT AND VEGETABLE COMMITTEE, AUGUST 28, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and eighteen members present.

Awards Recommended:—

Silver-gilt Knightian Medal.

To Messrs. Bunyard, Maidstone, for fifty dishes of Fruit.

Silver Knightian Medal.

To Messrs. Paul, Waltham Cross, for Fruit Trees in pots.

To the University College, Reading, for a collection of Melons.

Silver Banksian Medal.

To Messrs. Sutton, Reading, for fifty distinct varieties of Dwarf and Runner Beans.

To Messrs. Carter Page, London Wall, for Tomatoes and Gourds.

Other Exhibits.

Mr. Ross, gr. to Col. Archer Houlton, Welford Park, Newbury, sent Apple 'Eva,' which the Committee wished to see growing next year.

Dr. Bonavia, Worthing, sent Melons 'Spotted Chitla harbaza' and 'Vert Grimpant,' both of indifferent flavour.

Mr. H. Parr, Trent Park Gardens, New Barnet, brought Melons 'Trent Perfection' and 'Beauty of Herts.'

Mr. F. Collis, Bollo Lane, Chiswick, staged Pear 'Improved Hessele,' not quite ripe; also a splendid dish of Apple 'Mank's Codlin,' from trees grown on their own roots.

Messrs. Bunyard, Maidstone, sent Pear 'Aspasie Aucourt.'

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 11, 1906.

Mr. J. CHEAL in the Chair, and seventeen members present.

Awards Recommended:—

Gold Medal.

To Messrs. Dobbie, Rothesay, for sixty distinct varieties of Turnips.

Hogg Medal.

To the Hon. Walter Long, M.P., Rood Ashton, Trowbridge (gr. Mr. Strugnell), for a collection of Fruit.

Silver Banksian Medal.

To Miss M. H. Dodge, Losely Park, Guildford (gr. Mr. Stanard), for a collection of Potatoes.

To Miss Adamson, South Villa, Regent's Park (gr. Mr. Kelf), for a collection of Fruit.

Cultural Commendation.

To Mr. Wadds, gr. to Sir W. D. Pearson, Worth Park, Sussex, for a collection of Melons.

Other Exhibits.

From the R.H.S. Gardens, Wisley, came Melon 'Wilhite,' which the Committee wished to see later.

Mr. Dalby, Greenham Lodge Gardens, Newbury, sent Apple 'Cook's Seedling.'

The Hon. A. H. T. de Montmorency, The Grange, Carrickmines, Dublin, sent Peach 'Carolie,' which arrived in bad condition.

Messrs. Harrison, Leicester, brought Crab 'The Harrison,' a very large variety, and excellent jelly made from the same.

Lady Plowden, Aston Rowant (gr. Mr. Clarke), sent Crab 'John Downie,' and branches of this variety covered with fruit.

Mr. J. Stevens, Mile Town, Sheerness, sent an Apple raised from Cox's Orange Pippin, but not so good as its parent.

Mr. F. M. Bradley, Peterborough, staged a white-fruited Cucumber.

Mr. W. Dawson, Alton, Hants, sent some very large ridge Cucumbers.

Mr. J. Crook, Forde Abbey Gardens, sent Peas in excellent condition to show the effect of spraying with a fungicide.

Mr. G. W. Miller, Wisbech, brought Apple 'Scarlet Beauty.'

Mr. W. F. Collis, Bollo Lane, Chiswick, staged Pear 'Collis's Hessele.'

Mr. Bannister, Cote House Gardens, Westbury-on-Trym, sent very fine Doyenne Boussoch Pears grown on bush trees.

FRUIT AND VEGETABLE COMMITTEE, SEPTEMBER 25, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty-seven members present.

Awards Recommended :—

Gold Medal.

To Messrs. Bunyard, Maidstone, for superb Fruit Trees in pots.

Silver-gilt Knightian Medal.

To Captain Speer, Sandown Lodge, Esher, for seventy varieties of Gourds.

Award of Merit.

To Tomato 'Lye's Early Gem' (votes, 20 for), from Mr. R. Lye, Sydmonton Court, Newbury, a medium-sized flat round fruit, bright scarlet, produced in large clusters; very solid and of good flavour. All the fruit exhibited had been grown on outside walls, for which purpose it appears to be eminently suited.

To Apple 'Miller's Seedling' (votes, unanimous), from Mr. Fyfe, gr. to Lady Wantage, Lockinge Park, Wantage. Fruit above medium size, slightly ribbed, pale yellow, with a delicate flush on the exposed side; eye half open with reflexed segments, stalk thin, half-inch long, deeply inserted; flesh crisp and good, and said to cook well. The variety is a favourite in Berkshire and a great bearer.

To Pear 'Collis's Hessel' (votes, 11 for, 1 against), from Mr. F. Collis, Bollo Lane, Chiswick. A deputation of the Committee, viz. Mr. A. Thomas, V.M.H., and Mr. W. Poupart, inspected the tree on which this fruit had grown, and stated that the variety or form had sported on the Hessel, producing much larger fruits than the ordinary 'Hessel,' and differing only from that variety in its much greater size. Young trees raised from the "sport" showed the same very marked improvement.

Cultural Commendation.

To Mr. Slade, gr. to Lord Poltimore, Exeter, for splendid fruits of Pear 'Michaelmas Nelis.'

Other Exhibits.

A. L. Sabine, Esq., 88 Underhill Road, East Dulwich, sent a seedling Apple, raised from 'Newton Pippin,' past its best.

Mr. H. H. Gould, Synce Grove, Southampton, sent a Potato under the name of 'Southern Queen.' The Committee requested tubers to be sent to Wisley under another name, as there were already varieties in commerce under that name.

Mr. Divers, gr. to the Duke of Rutland, Belvoir Castle, brought Apple 'Dewdney's Seedling.'

Mr. H. J. Dover, Langley, Bucks, sent 'Muscat of Alexandria' Grapes, not quite ripe, but excellent in other respects.

Messrs. Harrison, Leicester, staged Crab 'The Leicester,' a very large variety, of pale colour.

Mr. W. Taylor, Tewkesbury Lodge Gardens, Forest Hill, brought Pear 'Lebrun,' not quite ripe.

Mr. Markham, gr. to Lord Enfield, Wrotham Park, Barnet, sent Melon 'The Castle,' over-ripe.

Messrs. Cannell, Swanley, sent Apple 'The Cray.'

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 9, 1906.

Mr. A. H. PEARSON in the Chair, and fifteen members present.

Awards Recommended :—

Hogg Memorial Medal.

To J. A. Nix, Esq., Tilgate, Crawley (gr. Mr. Neal), for a collection of Fruit.

Silver-gilt Knightian Medal.

To Mr. R. W. Green, Wisbech, for Potatoes.

Silver Knightian Medal.

To Mr. B. Comyns, Heath Farm, Watford, for Onions.

Award of Merit.

To Potato 'Dr. Gillespie' (votes, unanimous), from Messrs. Barr, Covent Garden. This variety had been on trial at Wisley.

Other Exhibits.

W. J. Lingard, Leicester, sent Apple 'Pride of Aylestone,' which the Committee desired to see again later.

Mr. T. Clarke, Deepcar, Sheffield, sent Potato 'Haywood Beauty,' which the Committee wished to be tried at Wisley.

Mr. G. W. Onion, Sidmouth, sent a seedling Potato, which was also requested to be tried at Wisley.

Miss M. H. Dodge, Loxley Park, Guildford, sent Runner Beans, which were desired to be tried at Wisley.

Mr. W. Taylor, Tewkesbury Lodge Gardens, Forest Hill, sent very fine fruits of Pear 'Lebrun.'

Mr. A. Stern, Blandford, Goudhurst, staged Apple 'Sir Richard Bailie.'

Mr. Steinhoff, Hepworth House, Wood Green, brought two dishes of Apples.

Mr. Sanderson, Buller's Wood, Chislehurst, sent a very long Gourd.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 16, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and thirty-seven members present.

Awards Recommended :—

Cultural Commendation.

To King's Acre Nursery Co., Hereford, for very fine 'Washington' Apples.

To Mr. Clark (gr. to Lady Plowden), Aston Rowant, for exceedingly fine Pears.

Other Exhibits.

Mr. Ross (gr. to Colonel Archer Houblon) sent Apple 'Encore,' which the Committee wished to see again in December.

Mr. Slade (gr. to Lord Poltimore), Exeter, brought Pears.

Mr. W. H. Bannister, Cote House, Westbury-on-Trym, staged Pear 'Virginia,' which somewhat resembles 'Michaelmas Nelis.'

Mr. C. Webster, Gordon Castle, Fochabers, sent 'Automne Compote' Plum.

Mr. R. Doe, Charlton Park Gardens, Malmesbury, staged Melons.

Mr. G. S. Croft, Withington, Hereford, brought Apple 'Gospatric.'

Mr. A. Faulkner, Hungerford, sent Nut 'Merveille de Bolwyller.'

Sir J. Lawson Walton, M.P., Tring, Bucks, sent Apple 'Lord Derby.'

Messrs. Bunyard, Maidstone, staged Apple 'Lord Castlereagh.'

Messrs. Jeffries, Cirencester, brought a promising unnamed Apple.

FRUIT AND VEGETABLE COMMITTEE, OCTOBER 23, 1906.

Mr. J. CHEAL in the Chair, and fourteen members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Major Bythway, Warborough, Llanely, for a collection of Apples.

Silver Knightian Medal.

To W. H. Barber, Esq., Culham Court, Henley-on-Thames (gr. Mr. Turnham), for Onions.

To the University College, Reading, for a collection of Vegetables.

Silver Banksian Medal.

To H. Whiteley, Esq., St. Marychurch, Torquay, for a collection of Apples.

To W. Roupell, Esq., Roupell Park, S.W., for Frontignan Grapes.

To Lord Aldenham, Elstree (gr. Mr. E. Beckett, V.M.H.), for Broccoli.

Award of Merit.

To Broccoli 'Michaelmas White' (votes, unanimous), from Mr. Beckett (gr. to Lord Aldenham), Elstree, a very hardy, self-protecting variety, of good size and form.

To Potato 'Brydon's Crampton' (votes, unanimous), from Messrs. Kent & Brydon, Darlington.

To Potato 'Russet Queen' (votes, unanimous), from Mr. T. A. Scarlett, Edinburgh. Both the above varieties of Potatoes had been grown at Wisley.

Other Exhibits.

Mr. W. Hatch, Southend-on-Sea, sent Apples.

Mr. J. W. Harris, Bucklebury Place Gardens, Woolhampton, brought Melon 'Superlative.'

Mr. J. Coulson, Hexham, Northumberland, sent a seedling Potato, which the Committee wished tried at Wisley.

Mr. E. Beckett, Aldenham House Gardens, Elstree, staged Celery 'Aldenham Pink Perfection,' which the Committee wished to be tried at Wisley.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 6, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and fifteen members present.

Awards Recommended :—

Hogg Memorial Medal.

To the Duke of Rutland, Belvoir Castle, Grantham (gr. Mr. Divers), for a collection of Fruit.

Silver Banksian Medal.

To J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davies), for a group of Chillies.

Bronze Banksian Medal.

To Mr. H. J. Dover, Langley, Bucks, for 'Muscat of Alexandria' Grapes.

To Messrs. Low, Bush Hill Park, for Apples.

First-class Certificate.

To Apple 'James Grieve' (votes, unanimous), from Mr. Divers, gr. to the Duke of Rutland, Belvoir Castle. An Award of Merit was given to this delicious dessert Apple some years ago. Since then it has proved such a free-bearing excellent variety on almost all soils that the higher award was unanimously granted. Season September and October.

Other Exhibits.

Gordon Salmon, Esq., Overton Vicarage, York, sent Apple 'Salmon Ferox.' A seedling from Cox's Orange Pippin, but not so good as its parent.

From the Royal Jersey Agricultural and Horticultural Society, Jersey, came an enormous fruit of 'Doyenne du Comice' Pear, weighing 2 lb.

Mr. J. Carter, Woking, brought seedling Apples of no special merit.

Messrs. Backhouse, York, sent seedling Apples.

Mr. J. Hathaway, Baldersby Gardens, Thirsk, also sent seedling Apples.

Messrs. Low staged Apple 'Ard Cairn,' a dessert variety of Irish origin and said to keep well till Easter.

FRUIT AND VEGETABLE COMMITTEE, NOVEMBER 20, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and twenty-two members present.

Awards Recommended :—

Silver-gilt Knightian Medal.

To Mrs. Henderson, Sedgwick, Horsham (gr. Mr. Muddell), for a collection of Apples.

Bronze Banksian Medal.

To Messrs. Massey, Spalding, for Potatoes.

Other Exhibits.

Messrs. Dobbie, Marks Tey, Essex, staged Borecole.

Mr. J. G. West, Brentwood, sent seedling Apples.

Mr. E. Ryder, Orpington, brought Apple 'Ryder's Scarlet.'

E. G. Wythes, Esq., Bickley Park, Kent, sent Fruit and Vegetables.

FRUIT AND VEGETABLE COMMITTEE, DECEMBER 11, 1906.

Mr. G. BUNYARD, V.M.H., in the Chair, and nineteen members present.

Awards Recommended :—

Hogg Medal.

To Lord Aldenham, Aldenham House, Elstree (gr. Mr. Beckett, V.M.H.), for fifty dishes of Apples.

Silver Knightian Medal.

To the Dowager Lady Hillingdon, Wilderness, Sevenoaks (gr. Mr. Shelton), for forty-eight dishes of Apples and Pears.

To the University College, Reading (gr. Mr. Foster), for Vegetables.

Silver Banksian Medal.

To Sir E. G. Loder, Bart, Leonardslee, Horsham (gr. Mr. Cook), for Apples and Pears.

To Mr. W. Deal, Kelvedon, for Potatoes.

To Mr. R. W. Green, Wisbech, for Potatoes.

Bronze Banksian Medal.

To Messrs. Massey, Spalding, for Potatoes and Onions.

Award of Merit.

To Apple 'Encore' (votes, unanimous), from Colonel Archer Houblon (gr. Mr. C. Ross). Fruit large, even in outline; skin yellow, streaked and flushed with red on the exposed side; eye large; open, erect segments, set in a rather deep even basin; stalk thin, half-inch long, and inserted in a deep cavity; skin very greasy; flesh crisp, juicy, and pleasantly acid. A very handsome cooking variety. The tree is said to be a strong grower and free bearer, raised from Warner's King \times Old Northern Greening.

Other Exhibits.

Mr. S. A. Scarlett, Edinburgh, sent Potato 'What's Wanted,' which the Committee wished to be tried at Wisley.

Mr. H. G. Wadlow, Peterborough, sent a seedling Apple.

Messrs. Toogood, Southampton, staged Apple 'Cox's Pomona.'

Messrs. Low, Bush Hill Park, brought Apple 'Ard Cairn Russet.'

Messrs. Cutbush, Highgate, sent Tomato 'Murtown Seedling.'

Mr. R. Lye, Sydmonton Court, Newbury, sent Tomato 'Lye's Early Gem.'

Mr. Emmony, Streatham, staged two varieties of Apples.

NARCISSUS AND TULIP COMMITTEE.

MARCH 20, 1906.

Mr. H. B. MAY in the Chair, and twenty-four members present.

A dozen new Daffodils were submitted, but none secured awards.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. Chas. Dawson, Gulval, Penzance, for a well-arranged group of fine flowers of the newer Daffodils.

Silver Banksian Medal.

To Messrs. Barr & Sons, Covent Garden, for a group of Daffodils, chiefly 'Ajax' varieties.

To Sir Josslyn Gore-Booth, Lissadel, Sligo, for a group of very brightly coloured Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 3, 1906.

Mr. H. B. MAY in the Chair, and twenty-two members present.

Thirteen new Daffodils and five groups were judged by the Committee.

Following a discussion opened by the Rev. G. Engleheart, V.M.H., the Committee agreed, at the suggestion of the Chairman, to recommend the Council to hold a special exhibition of forced Daffodils in the spring of 1907, at which special awards might be made to varieties of proved merit for forcing.

The Sub-Committee to deal with Tulips only was elected as follows :—Miss Willmott, Rev. J. Jacobs, Messrs. J. Walker, W. T. Ware, R. Wallace, W. Poupart, P. R. Barr, E. A. Bowles, D. Pearson, G. W. Leak, R. Sydenham, and J. T. Bennett-Poë.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Miss F. W. Currey, Lismore, Ireland, for a group of especially fine Irish-grown Daffodils.

To Mr. C. G. van Tubergen, Haarlem, Holland, for an effective and interesting group of large Tulip blooms. Several new introductions were staged.

Silver Banksian Medal.

To Sir Josslyn Gore-Booth, Lissadell, Sligo, for a large display of Daffodils, consisting chiefly of well-known varieties.

To Messrs. Barr & Sons, Covent Garden, for a group of Daffodils that included several blooms of their new 'Peter Barr.'

Award of Merit.

To Narcissus 'The Rising Sun' (votes, unanimous), from Mr. W. Welchman, Upwell, Wisbech. A well-proportioned 'Ajax' variety; rich yellow, shining as though burnished.

To Narcissus 'Mrs. Robert Sydenham' (votes, 15 for, 2 against), from Miss F. W. Currey, Lismore, Ireland. A large 'Ajax' variety, with a bold trumpet that suggests descent from *N. triandrus*. The flower is wholly creamy-white and the trumpet is clean cut across the mouth.

To Narcissus 'Brilliancy' (votes, unanimous), from the Rev. G. H. Engleheart, V.M.H., Dinton, Hants. A showy variety that is like a very much improved *Barri conspicuus*. The cup is brilliant orange-scarlet.

Other Exhibits.

Messrs. William Bull & Sons, King's Road, Chelsea, submitted a small group of Daffodils.

NARCISSUS AND TULIP COMMITTEE, APRIL 17, 1906.

Mr. H. B. MAY in the Chair, and twenty-three members present.

Twenty-six new Daffodils were brought before the Committee, and thirteen groups were staged.

Awards Recommended:—*Silver Flora Medal.*

To Miss F. W. Currey, Lismore, Ireland, for a group of Daffodils that was admirably staged. It included 'Queen Sophia,' 'Egret,' 'Una,' 'Glory of Leiden,' &c.

To Messrs. Barr & Sons, Covent Garden, for a display of beautiful Daffodils. Notable varieties were 'Peter Barr,' 'King Alfred,' 'Weardale Perfection,' and 'Royal Star.'

To Messrs. J. R. Pearson & Sons, Lowdham, Notts, for an interesting exhibit of Daffodils that contained fine blooms of 'King's Norton,' 'Lady Margaret Boscawen,' 'Topaz,' and 'Florence Pearson.'

To Messrs. R. H. Bath, Ltd., Wisbech, for a large display of Daffodils, in which such large varieties as 'Weardale Perfection,' 'King Alfred,' and 'Glory of Leiden' were conspicuous.

To Mr. A. Wilson, East Keal, Spilsby, for a group of large vases of 'Blood Orange,' 'Glory of Leiden,' 'Ariadne,' 'Blackwell,' and other fine Daffodils.

Silver Banksian Medal.

To Messrs. Hogg & Robertson, Dublin, for a group consisting chiefly of *incomparabilis* and *Leedsii* Daffodils.

To Messrs. J. Pope & Son, King's Norton, for a group of large Daffodils, rather stiffly bunched.

To Sir Josslyn Gore-Booth, Lissadell, Sligo, for a selection of popular Daffodils.

Award of Merit.

To *Narcissus* 'Pearl of Kent' (votes, 15 for, 0 against), from the Rev. G. P. Haydon, Westbere, Canterbury. A large, finely proportioned 'Ajax' variety, with ample perianth segments and a soft ivory-white, bold, frilled trumpet.

To *Narcissus* *Warleyensis* (votes, unanimous), from Miss Willmott, V.M.H., Warley Place, Great Warley, Essex. A very fine golden yellow 'Ajax' variety; flowers well expanded; stems very stout and long.

To *Narcissus odoratus rugulosus maximus* (votes, 16 for, 0 against), from Messrs. Barr & Sons, Covent Garden. A glorified form of an old garden favourite. The flowers are golden-yellow, 3 inches across.

Other Exhibits.

Mr. Robert Sydenham, Tenby Street, Birmingham, staged a small group of Daffodils growing in moss fibre in undrained pots.

Messrs. William Bull & Sons, King's Road, Chelsea, set up a small group of Daffodils.

Messrs. W. Gilbert & Son, Dyke, Bourne, Lincs., exhibited Daffodils and Tulips.

Mr. G. Reuthe, Fox Hill Nursery, Keston, showed a few Daffodils and some very large Tulip flowers.

Miss Willmott, V.M.H., Great Warley, sent vases of *Warleyensis* and 'Duchess of Bedford' Daffodils.

Rev. G. H. Engleheart, V.M.H., Dinton, Hants, contributed several beautiful unnamed seedling Daffodils.

BARR DAFFODIL CUP COMPETITION.

On this date the competition for the Barr Daffodil Cup was held. There were four competitors on this occasion. The Cup was awarded to the Rev. G. P. Haydon, Westbere, Canterbury, who had good blooms and a number of seedlings of his own raising. Miss Katherine Spurrell, Hanworth, Norwich, was awarded the second prize, a Silver Flora Medal.

The judges expressed an opinion that considerable improvement might have been shown in the staging of the first-prize exhibit, and they deprecated the use of board and tubes in the second-prize exhibit.

NARCISSUS AND TULIP COMMITTEE, MAY 1, 1906.

Mr. H. B. MAY in the Chair, and twenty-two members present.

Seven new Daffodils and twelve new Tulips were brought before the Committee, and there were six groups staged.

A resolution, "That when Daffodils are sent to the Committee for awards only the foliage belonging to the variety may be shown with the flowers," was submitted and discussed, but was lost.

Awards Recommended :—

Gold Medal.

To Miss Willmott, V.M.H., Warley Place, Great Warley, Essex, for an exceptionally fine group of rare Daffodils. This display gave ample

evidence of the great advances made in the raising of new Daffodils during recent years, while in arrangement and from a cultural point of view it was of unusual excellence.



FIG. 59.—NARCISSUS 'MASTERPIECE.' (*Journal of Horticulture*.)

Silver-gilt Banksian Medal.

To Mr. Alex. M. Wilson, East Keal, Spilsby, for a group of very clean and bright Daffodils, the leading varieties being 'Eoster,' 'Spenser,' 'Blood Orange,' 'Horace,' and 'White Lady.'

Silver Banksian Medal.

To Messrs. R. H. Bath, Ltd., Wisbech, for a group of Daffodils and Tulips.

Bronze Banksian Medal.

To the Hon. Mrs. Chichester, Dunbrody Park, Arthurstown, co. Wexford, for a small exhibit of very large and brightly coloured 'Darwin' Tulips.

First-class Certificate.

To *Tulipa Fosteriana* (votes, unanimous), from the Tulip trials at the Society's Gardens, Wisley, sent by Mr. C. G. van Tubergen, Haarlem, Holland. This fine Bokharan species grows 2 feet high, and has large, vivid scarlet, yellow-based flowers (A.M. April 25, 1905).

Award of Merit.

To Narcissus 'Eoster' (votes, 10 for, 4 against), from Mr. Alex. M. Wilson, East Keal, Spilsby. A finely proportioned *incomparabilis* variety. The broad perianth segments are white, and the cup sulphur yellow.

To Narcissus 'Masterpiece' (votes, unanimous), from Messrs. Barr & Sons, Covent Garden. A *Burbidgei* variety of unusual substance. The perianth is white, and the broad flat crown rich orange-red.

To Narcissus 'Princess Ena' (votes, unanimous), from Messrs. Barr & Sons, Covent Garden. This fine 'Ajax' variety has probably descended from *N. triandrus*. It has large creamy-white perianth segments and a large, slightly frilled, soft yellow trumpet.

Botanical Certificate.

To *Tulipa Greigii alba* (votes, unanimous), from Mr. C. G. van Tubergen, Haarlem, Holland. The Committee did not consider the variety's name was justified, as the flowers were pink-flushed and not white.

Other Exhibits.

Messrs. William Bull & Sons, King's Road, Chelsea, contributed a group of Tulips.

Messrs. Barr & Sons, Covent Garden, submitted a small display of Daffodils and Tulips.

NARCISSUS AND TULIP COMMITTEE, MAY 15, 1906.

Mr. J. T. BENNETT-POË in the Chair, and fifteen members present.

Before the regular business was commenced the Committee passed a vote of condolence and sympathy with Mr. H. B. May, the Chairman of the Committee, who had just sustained irreparable loss by the death of his wife.

Thirty-seven varieties of Tulips and eleven groups of Tulips were staged.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. R. Wallace & Co., Colchester, for a large collection of choice garden Tulips, all represented by well-developed blooms. 'Mr.

Farncombe Saunders,' 'Inglescombe Pink,' and 'Clara Butt' were splendidly shown.

Silver-gilt Banksian Medal.

To Messrs. R. H. Bath, Limited, Wisbech, for a group of large Tulips, the 'Darwin' varieties being especially well shown.

Silver Flora Medal.

To Messrs. Hogg & Robertson, Dublin, for a handsome collection of about fifty distinct varieties of Tulips.

To Messrs. A. Dickson & Sons, Limited, Newtownards, co. Down, for a group of Tulips in which the flowers were especially large.

To Mr. Alex. Wilson, East Keal, Spilsby, for a collection of the finer late Tulips, admirably staged.

Silver Banksian Medal.

To Messrs. Barr & Sons, Covent Garden, for a collection of 'Darwin' and other late Tulips.

Award of Merit.

To *Tulipa Gesneriana lutea* (votes, 13 for, 0 against), from Messrs. Hartland & Son, Cork. This is a useful late variety, with clear, light yellow flowers.

To Tulip 'Henner' (votes, 13 for, 0 against), from Messrs. R. Wallace & Co., Colchester. A 'Darwin' variety, with mahogany-red flowers; the base is violet inside and white outside; segments very broad and rounded.

To Tulip 'Millet' (votes, 12 for, 0 against), from Messrs. R. Wallace & Co. A shapely 'Darwin' variety; bright red, with black base.

To Tulip 'Psyche' (votes, 11 for, 0 against), from Messrs. R. Wallace & Co. A pretty variety; rich pink, with silvery-pink shading.

To Tulip 'Isis' (votes, unanimous), from Messrs. R. Wallace & Co. A very bold, vivid crimson 'Darwin variety.'

To Tulip 'Beauty of Bath' (votes, 7 for, 3 against), from Messrs. Walter T. Ware, Limited, Inglescombe, Bath. A charming fancy Tulip, with pointed yellow flowers, flushed with red-purple on the outer surface.

To Tulip 'Walter T. Ware' (votes, unanimous), from Messrs. Walter T. Ware, Limited. This is the richest yellow Tulip to date. The flowers are of medium size, oval, and clear deep yellow.

To Tulip 'Yellow Picotee' (votes, 8 for, 3 against), from Messrs. Walter T. Ware. A showy variety, clear yellow, with the segments all margined with crimson scarlet.

To Tulip 'Inglescombe Yellow' (votes, unanimous), from Messrs. Walter T. Ware, Limited. A very large, soft yellow variety, long-stemmed and handsome. Very like a 'Darwin' variety.

Other Exhibits.

Messrs. Walter T. Ware, Limited, Inglescombe Nurseries, Bath, contributed a small collection of choice Tulips, the flowers being remarkably fine in size and colouring. Several of these gained awards.

Messrs. Paul & Son, The Old Nurseries, Cheshunt, contributed a small group of Tulips.

Messrs. William Bull & Sons, King's Road, Chelsea, sent up a small collection of Tulips.

Mr. G. Reuthe, Keston, Kent, submitted some remarkably large late Tulip blooms.

Messrs. James Veitch & Sons, Limited, King's Road, Chelsea, staged a few vases of Tulips.

Messrs. T. S. Ware, Limited, Feltham, contributed a collection of Tulips.

ORCHID COMMITTEE.

By an unfortunate mistake the four following figures of Orchids exhibited by F. Wellesley, Esq., were omitted from the Proceedings of the Orchid Committee for 1905, namely:—

Cypripedium × *memoria Jerninghamiæ*, A.M. January 3, 1905. JOURNAL R.H.S. vol. xxxi. p. clvii.

Cypripedium × *westfieldiense*, A.M. January 3, 1905. JOURNAL R.H.S. vol. xxxi. p. clviii.

Lælio-Cattleya × *Charlesworthii magnifica*, A.M. January 24, 1905. JOURNAL R.H.S. vol. xxxi. p. clvix.

Lælia × *Iona nigrescens*, A.M. February 28, 1905. JOURNAL R.H.S. vol. xxxi. p. clx.—EDITOR.



FIG. 60.—*CYPRIPEDIUM* × *MEMORIA JERNINGHAMIÆ*, A.M.



FIG. 61.—CYPRIPEDIUM × WESTFIELDIENSE, A.M.



FIG. 62.—*LÆLIO-CATTELEYA* × *CHARLESWORTHII* *MAGNIFICA*. **A.M.**

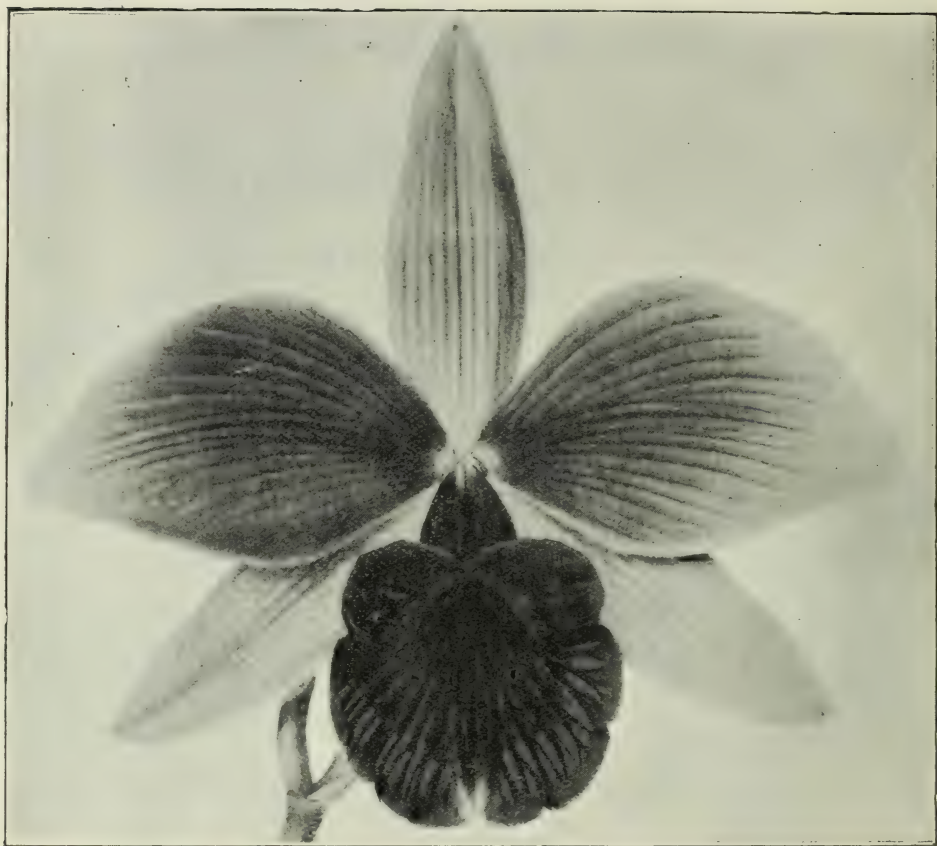


FIG. 63.—*LÆLIA* × *IONA NIGRESCENS*, A.M.

JANUARY 9, 1906.

Mr. J. GURNEY FOWLER in the Chair, and twenty-two members present.

Awards Recommended :—

Silver Flora Medal.

To F. Menteith Ogilvie, Esq., Oxford (gr. Mr. Balmforth), for a group of Orchids.

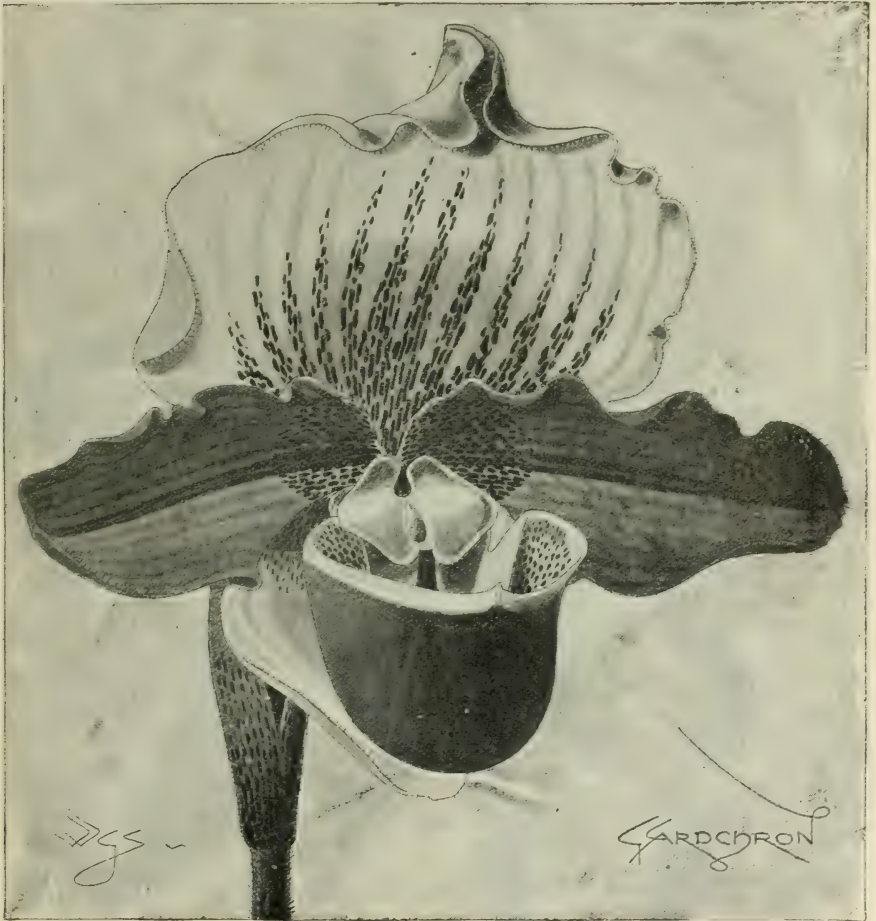


FIG. 64.—CYPRIPEDIUM × ALCIBIADES MAGNIFICUM. (*Gardeners' Chronicle*.)

To Messrs. Sander for a group of Orchids.

To Messrs. J. Cypher for a group of Cypripediums, *Lælia anceps*, &c.

Silver Banksian Medal.

To C. J. Lucas, Esq., Horsham (gr. Mr. Duncan), for a group of Orchids.

To Messrs. Hugh Low, for a group of Orchids.

To Messrs. Stanley, Southgate, for Cattleyas &c.

To M. Charles Vuylsteke, Ghent, for hybrid Odontoglossums.

First-class Certificate.

To *Cypripedium* × *Alcibiades* *magnificum* (*Leeanum giganteum* × 'Mons. de Curte') (votes, unanimous), from Major G. L. Holford, C.I.E.,



FIG. 65.—*CYPRIPEDIUM* × 'BELLA,' WESTFIELD VARIETY.

C.V.O., Westonbirt (gr. Mr. Alexander). Flowers large; dorsal sepal white, with a green base and purple dotted lines; petals and lip yellow, tinged and marked with purple-brown.

Award of Merit.

To *Catasetum* \times *splendens punctatissimum* (votes, unanimous), from Sir Trevor Lawrence, Bart (gr. Mr. W. H. White). Lip fleshy, bright yellow; sepals and petals whitish, densely spotted with purple.

To *Cypripedium* \times 'Bella,' Westfield variety (*vexillarium* \times *philippinense*) (votes, unanimous), from Francis Wellesley, Esq., Westfield



FIG. 66.—*LÆLIO-CATTELEYA* \times 'HELENA,' WESTFIELD VARIETY.

(gr. Mr. Hopkins). Flowers gracefully produced, as in *C. philippinense*, but with the rose colouring of *C.* \times *vexillarium*.

To *Lælio-Cattleya* \times 'Helena,' Westfield variety (*L. cinnabarina* \times *C. Schilleriana*) (votes, unanimous), from Francis Wellesley, Esq. Plant tall; flowers bright orange with purple-veined labellum.

To *Brasso-Cattleya* \times *Pyrrha* (*B. glauca* \times *C. labiata*) (votes, unanimous), from Messrs. James Veitch, Chelsea. Plant dwarf; flowers as large as *C. labiata*, rose-coloured, fragrant.

To *Cypripedium* × 'The Earl of Tankerville' (*exul* × *nitens*, Sander's variety) (votes, unanimous), from Messrs. Sander, St. Albans. Flowers of fine form and substance; dorsal sepal white with emerald-green base and broad lines of purple spots; petals and lip yellow marked with reddish-purple.

Botanical Certificate.

To *Brassavola glauca*, from H. S. Goodson, Esq., Putney (gr. Mr. Day). Flowers white, fragrant.

Cultural Commendation.

To Mr. Balmforth, gr. to F. Menteith Ogilvie, Esq., for a finely flowered specimen of *Lycaste* × *Balliæ*.

Diploma Awards:—

First Diploma (hybrids).

To *Calanthe* × *Harrisii*, from Norman C. Cookson, Esq. Flowers white.

Second Diploma (hybrids).

To *Calanthe* × *Veitchii*, from Jeremiah Colman, Esq. (gr. Mr. W. P. Bound). The fine old bright rose-pink variety.

First Diploma (species).

To *Calanthe vestita rubro-oculata gigantea*, from Norman C. Cookson, Esq. A strong grower with white flowers with crimson centres.

Other Exhibits.

Major G. L. Holford, C.I.E., C.V.O., Francis Wellesley, Esq., De B. Crawshay, Esq., and others showed varieties of *Lælia anceps*, but no diplomas were awarded.

J. Gurney Fowler, Esq. (gr. Mr. J. Davis), sent four varieties of *Cypripedium* × *aureum* and other *Cypripediums*.

Norman C. Cookson, Esq. (gr. Mr. Chapman), and Jeremiah Colman, Esq. (gr. Mr. Bound), staged fine groups of *Calanthes*.

H. S. Goodson, Esq. (gr. Mr. Day), showed four hybrid Orchids.

Messrs. William Bull, Chelsea, showed *Sophro-Cattleya* × 'Doris' and others.

ORCHID COMMITTEE, JANUARY 23, 1906.

Mr. J. GURNEY FOWLER in the Chair, and seventeen members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Baron Sir H. Schröder, Bart., The Dell, Egham (gr. Mr. Ballantine), for a fine group of Orchids.

To Messrs. Charlesworth, Bradford, for a display of *Lælio-Cattleya* × *Charlesworthii* and other hybrids.

To Messrs. Cypher, Cheltenham, for an extensive group of *Lælia anceps* (white varieties), *Cypripediums*, &c.

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a varied group of rare Orchids.

Silver Banksian Medal.

To R. Briggs-Bury, Esq., Accrington (gr. Mr. Wilkinson), for rare *Cypripediums*.

To Messrs. Hugh Low, Enfield, for a group.

To M. Chas. Vuylsteke, Ghent, for hybrid *Odontoglossums*.

Award of Merit.

To *Cattleya* × 'Octave Doin' (*Mendelii* × *Dowiana aurea*) (votes, unanimous), from Messrs. Charlesworth. A fine flower with white sepals and petals tinged with rose and rose-purple lip having gold-coloured lines at the base.

To *Phaius maculatus* (votes, unanimous), from Messrs. Sander, St. Albans. Leaves plicate, green, unspotted; flowers, ten, on an erect inflorescence, large, yellow, with red markings on the lip.

To *Cypripedium* × *Bridgei* (*Godseffianum* × *Argus Moensii*) (votes, unanimous), from G. F. Moore, Esq. (gr. Mr. Page). A very dark-coloured flower, with rose ground, densely spotted with blackish-purple.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cypripedium* × *Dicksonianum* (*villosum* × *Hera Euryades*), *C.* × 'Cecil Dickson' (*Niobe* × *Leeanum*), *Brasso-Lælia* × 'Mrs. Gratrix,' Westfield variety, and other hybrids.

Messrs. Stanley, Southgate, showed a small collection of Orchids.

Messrs. Heath, Cheltenham, sent hybrid *Cypripediums*.

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed *Cypripedium* × *aureum Hyeonum*.

R. I. Measures, Esq. (gr. Mr. Smith), sent *Zygopetalum* × *Max-Jorisii* and other Orchids.

Messrs. William Bull, Chelsea, showed *Sophro-Cattleya* × 'Doris.'

Elijah Ashworth, Esq. (gr. Mr. Holbrook), showed *Cattleya Trianaei* 'Harefield Goliath.'

ORCHID COMMITTEE, FEBRUARY 13, 1906.

Mr. J. GURNEY FOWLER in the Chair, and twenty-seven members present.

Awards Recommended :—*Gold Medal and Lindley Medal for Culture.*

To Major G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander), for a magnificent group of white *Lælia anceps*, *Odontoglossums*, *Cypripediums*, and other Orchids.

Gold Medal.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for a very large group, principally *Dendrobiums*.

Silver-gilt Flora Medal.

To J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge), for a fine group of *Lycastes*, *Odontoglossums*, and *Cattleyas*.

To Messrs. Jas. Cypher, Cheltenham, for a fine and varied group.

Silver Flora Medal.

To G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page), for a group of hybrids of *Cypripedium villosum* and *Boxallii*.

To Messrs. Sander, St. Albans, for an interesting group.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. White), for yellow hybrid *Dendrobiums*.

To Messrs. McBean, Cooksbridge, for a collection of *Lælia anceps* &c.

To Messrs. Hugh Low, Enfield, for a group.

To M. Chas. Vuylsteke, Ghent, for hybrid *Odontoglossums*.



FIG. 67.—*ODONTOGLOSSUM* × *LAMBEAUIUM*. (*Journal of Horticulture*.)

First-class Certificate.

To *Cymbidium* × *Lowio-grandiflorum* (*Lowianum* × *grandiflorum*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). Flowers large; sepals and petals emerald-green; lip cream-white; spotted with red.

To *Cymbidium* × *Holfordianum* (*eburneum* × *grandiflorum*) (votes, unanimous), from Messrs. Sander. Flowers ivory-white, with a pale-green tint on the sepals and some purple spotting on the lip.

To *Odontoglossum* × *Lambeauium* (*Rolfæ* *ardentissimum* × *crispum* 'Madame Falcke') (votes, unanimous), from M. A. A. Peeters, Brussels. Flowers equal to the best spotted *O. crispum*; white blotched with rose-purple.



FIG. 68.—*CYPRIPEDIUM BOXALLII NIGRICANS*.

Award of Merit.

To *Lælio-Cattleya* × 'Myra,' Burford variety (*L. flava* × *C. Trianæi*) (votes, unanimous), from Sir Trevor Lawrence, Bart. Flowers bright yellow, with claret crimson lip.

To *Cattleya Trianæi*, 'Westonbirt variety' (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. Sepals and petals blush-white; front of lip purple, with narrow lavender margin.

To *Cypripedium Boxallii nigricans* (votes, unanimous), from Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins). The darkest form of the species. Dorsal sepal blackish purple, with white margin.

To *Dendrobium* × *Brodiei* (*Dominianum* × *Wigania*) (votes, unanimous), from Jeremiah Colman, Esq. (gr. Mr. Bound). Flowers white, shaded with rose; disc light purple.

To *Dendrobium* × 'Othello Colossus' (parentage unrecorded) (votes, unanimous), from Jeremiah Colman, Esq. Resembling a very large *Ainsworthii* with the lip claret-colour, with rose margin.

To *Spathoglottis* × *Colmani* (*aureo-Veillardii* × *aurea*, 'Gatton Park variety'). Flowers yellow spotted with crimson; side lobes and tip of labellum crimson.

To *Lycaste Skinneri Fascinator* (votes, unanimous), from F. Menteith Ogilvie, Esq., Oxford (gr. Mr. Balmforth). A large white flower tinted with rose.

To *Lycaste costata* (votes, unanimous), from H. S. Goodson, Esq., Putney (gr. Mr. Day). Flowers cream-white; lip fringed.

To *Cymbidium* × *eburneo-giganteum* (*eburneum* × *giganteum*) (votes, 12 for, 4 against), from Messrs. Charlesworth. Flowers formed like *C. giganteum* but larger, cream-white, marked with light red.

To *Lælia anceps Fascinator* (votes, unanimous), from Messrs. McBean, Cooksbridge. A very large finely coloured flower, resembling the variety *Chamberlainiana*, but with a purple feather on the outer halves of the petals.

To *Cypripedium* × *Edithæ Rowena* (*Chamberlainianum* × *bellatulum*) (votes, unanimous), from W. M. Appleton, Esq. Flower light purple densely spotted with claret colour.

To *Cypripedium* × 'G. F. Moore' var. *punctatissimum* ('Mrs. Wm. Mostyn' × *nitens Sallieri aureum*) (votes, unanimous), from G. F. Moore, Esq. Flower greenish yellow tinged purple, the dorsal sepal blotched with chocolate purple; upper part white.

Diploma Awards:—

Cattleya Trianæi.

First Diploma: To *Cattleya Trianæi* 'The Premier,' from J. Bradshaw, Esq.

Second Diploma: To *Cattleya Trianæi*, 'Westonbirt variety,' from Major G. L. Holford.

Lælia anceps (white varieties).

First Diploma: To *Lælia anceps Schröderiana*, from Major G. L. Holford, C.I.E., C.V.O., Baron Sir H. Schröder, Bart., and Jeremiah Colman, Esq.

Second Diploma : To *Lælia anceps* *Hollidayana rosefieldiensis*, from De B. Crawshay, Esq.

Cypripedium villosum and *Boxallii* (species).

First Diploma : To *Cypripedium Boxallii nigricans*, from Francis Wellesley, Esq.

C. villosum and *Boxallii* (hybrids).

First Diploma : To *Cypripedium* \times *aureum virginale* (*nitens* *Sallieri Hyeantum* \times *Spicerianum*), from J. Gurney Fowler, Esq., and G. F. Moore, Esq.

Second Diploma : To *Cypripedium* \times 'Mrs. Wm. Mostyn,' Chardwar variety, from J. Gurney Fowler, Esq., and G. F. Moore, Esq.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent various hybrid *Cypripediums*.

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed varieties of *Cypripedium* \times *aureum*.

R. I. Measures, Esq. (gr. Mr. Smith), showed a collection of cut Orchids.

H. Druce, Esq. (gr. Mr. Walker), showed hybrids of *Cypripedium villosum* and *Boxallii*.

Messrs. Jas. Veitch & Sons sent six hybrids of *Sophronitis grandiflora*.

ORCHID COMMITTEE, MARCH 6, 1906.

MR. J. GURNEY FOWLER in the Chair, and twenty-seven members present.

Awards Recommended :—

Gold Medal.

To W. A. Bilney, Esq., Fir Grange, Weybridge (gr. Mr. Whitlock), for a fine group of *Dendrobiums*.

Silver-gilt Flora Medal.

To the Hon. Walter Rothschild, Tring Park (gr. Mr. Dye), for a group of the stately *Lissochilus Horsfallii* imported from West Africa. The species first flowered with Mr. Horsfall, of Bellamour Hall, Staffordshire, in 1864, whose plant was figured in the "Botanical Magazine," t. 5486. Since that time it has not flowered in Europe until the present specimens. Mr. Walter Rothschild, knowing the conditions under which the plant grew in W. Africa, caused it to be treated as a river-bank plant, the specimens being placed in tubs of water and occasional waterings of liquid manure given. The plants grew most vigorously, the flower-spikes attaining a height of five feet. The upper part of the spikes bore seventy to a hundred large flowers and buds.

To Messrs. Charlesworth for a fine group of hybrid Orchids.

Silver Flora Medal.

To Baron Sir H. Schröder, Bart., The Dell, Egham (gr. Mr. Ballantine), for a group of *Calanthe* \times 'Baron Schröder' and *C. Regnieri*.

To Messrs. Cypher, Cheltenham, for a group of *Dendrobiums*, *Cypripediums*, &c.

Silver Banksian Medal.

To Messrs. Sander, St. Albans, for a group of Orchids.

To R. Briggs-Bury, Esq., Accrington (gr. Mr. Wilkinson), for a group of *Cypripediums*.

To Messrs. Stanley, Southgate, for a group of *Oncidium concolor*.

To M. Chas. Vuylsteke, Ghent, for hybrid *Odontoglossums*.

Bronze Banksian Medal.

To C. J. Lucas, Esq., for a group.

To Messrs. Hugh Low, for a group.



FIG. 69.—*SOPHRO-CATTLEYA* × *WARNHAMENSIS* 'CERISE.' (*Journal of Horticulture*.)

First-class Certificate.

To *Lissochilus Horsfallii* (votes, unanimous). A noble strong-growing species with lanceolate plicate leaves and stout spikes, each bearing seventy to a hundred flowers; sepals recurved, tinged and lined with purple; petals orbicular and extended forward, white, tinted with rose; side lobes of the lip erect, green, striped with purple, front lobe deep rose-purple; base and callus white. From the Hon. Walter Rothschild.

To *Sophro-Cattleya* × *warnhamensis* 'Cerise' (*C. amethystoglossa* × *S. grandiflora*) (votes, unanimous), from Sir W. Marriott, Blandford (gr. Mr. Denny). Inflorescence with four flowers of a bright reddish scarlet.

To *Odontoglossum* × *Fowlerianum* (*Rossii rubescens* × *cirrhosum*)
(votes, unanimous), from Messrs. Sander. Segment narrow and re-



FIG. 70.—*ODONTOGLOSSUM* × *FOWLERIANUM*. (*The Garden*.)

sembling *O. Rossii*; sepals white, densely spotted with chocolate-purple and tipped and margined with rose; blade of the lip long and narrow, rose-purple; base and callus yellow.

Award of Merit.

Dendrobium × *Wigania illustre* (*signatum* × *nobile nobilius*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A model flower, cream-white tinged with rose; disc of the lip orange with maroon blotch.

To *Dendrobium nobile* 'Perfection' (votes, unanimous), from Messrs. Cypher. Flower round and with broad petals, white tinged with magenta rose and having a dark purple blotch on the lip.

To *Odontoglossum Rossii immaculatum* (votes, unanimous), from De B. Crawshay, Esq. (gr. Mr. Stables). Almost an albino, the sepals having no dark markings; petals and lip white.

To *Dendrobium* × *Wiganianum*, 'Gatton Park variety' (*Hildebrandii* × *nobile*) (votes, unanimous), from Jeremiah Colman, Esq. (gr. Mr. Bound). Flowers large, cream-white flushed with rose; disc of the lip purple.

To *Cælogyne* (*Pleione*) *yunnanensis* (votes, unanimous), from Messrs. Sutton & Sons, Reading. A dwarf Orchid from China, bearing pretty rosy-lilac flowers three inches in height.

To *Odontioda* × *heatonensis* (*O. cirrhosum* × *Cochlioda sanguinea*) (votes, unanimous), from Messrs. Charlesworth. A curious hybrid with small whitish flowers spotted with rose.

To *Brasso-Cattleya* × *Digbyano-Mendelii* var. *Fortuna* (*B. Digbyana* × *C. Mendelii*) (votes, unanimous), from J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge). Flowers white tinged with green.

Botanical Certificate.

To *Cynorchis compacta*, from Baron Sir H. Schröder, Bart. (gr. Mr. Ballantine). A dwarf African species with short dense spikes of white flowers.

Cultural Commendation.

To Mr. W. H. White, Orchid-grower to Sir Trevor Lawrence, Bart., for *Dendrobium Sybil* and *D. superbum Burkei*, both finely flowered.

To Mr. W. P. Bound, gr. to Jeremiah Colman, Esq., for *Masdevallia* × *Pourbaixii* with many flowers.

Diploma Awards :—

Dendrobium nobile (varieties).

First Diploma: To *Dendrobium nobile* 'Perfection,' from Messrs. Cypher, Cheltenham.

Second Diploma: To *Dendrobium nobile Dormanianum*, from Jeremiah Colman, Esq.

Dendrobium aureum and *D. nobile* hybrids.

First Diploma: To *Dendrobium* × *Wiganianum*, 'Gatton Park variety,' from Jeremiah Colman, Esq.

Second Diploma: To *Dendrobium* × *Ainsworthii intertextum*, from Baron Sir H. Schröder, Bart.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent hybrid *Lælio-Cattleyas* and *Cyripediums*.

Messrs. Heath, Cheltenham, staged a small group.

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), showed *Chysis laevis superba*.

Jeremiah Colman, Esq., showed hybrid *Dendrobiums*.

Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), sent fine specimens of *Dendrobium* × *Wigania* *album* and other hybrids.

De B. Crawshay, Esq., again showed the very fine *Odontoglossum triumphans* 'Lionel Crawshay,' *O. t. Crawshayanum*, and *O. × Andersonium Youngi*.

ORCHID COMMITTEE, MARCH 20, 1906.

Mr. J. GURNEY FOWLER in the Chair, and twenty-eight members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Baron Sir H. Schröder, Bart., The Dell, Egham (gr. Mr. H. Ballantine), for a fine group of Orchids, including the rare *Odontoglossum Pescatorei Schröderianum* and *Veitchianum*.

To Messrs. Charlesworth, Bradford, for a fine group, including hybrid *Odontoglossums*.

Silver Flora Medal.

To Messrs. Jas. Cypher, Cheltenham, for a group of *Dendrobiums*, *Odontoglossums*, &c.

Silver Banksian Medal.

To Messrs. Sander & Sons, St. Albans, for a group.

To Messrs. Hugh Low, Enfield, for a group.

First-class Certificate.

To *Odontoglossum* × *Lambeauianum roseum* (*Rolfeæ ardentissimum* × *crispum* 'Madame Falcke') (votes, unanimous), from M. A. A. Peeters, Brussels. Flower large and with broad segments, pale rose, heavily blotched on the sepals and petals with rose-purple.

Award of Merit.

To *Cypripedium villosum* 'The Premier' (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A massive form, of thicker substance than typical *villosum*, and fine colour.

To *Lælio-Cattleya* × 'Sunray' var. *superba* (*L. cinnabarina* × *C. superba*) (votes, unanimous), from Messrs. Charlesworth. Flowers several on erect spikes, orange-colour, with crimson front to the labellum.

To *Cypripedium* × *aureum Hyeatum* (*nitens Sallieri Hyeatum* × *Spicerianum*) (votes, unanimous), from F. Menteith Ogilvie, Esq., The Shrubby, Oxford (gr. Mr. Balmforth). A large greenish flower with chocolate-purple band up the dorsal sepal, and white upper half.

Cultural Commendation.

To Mr. W. H. White, Orchid-grower to Sir Trevor Lawrence, Bart., for *Phalænopsis Aphrodite*, with eighty flowers and buds on a branched spike.



FIG. 71.—CYPRIPEDIUM VILLOSUM 'THE PREMIER.'

To Mr. Alexander, Orchid-grower to Major G. L. Holford, C.I.E., C.V.O., for a magnificent specimen of *Odontoglossum crispum* *Iolanthe*.

Other Exhibits.

Norman C. Cookson, Esq. (gr. Mr. Chapman), showed *Dendrobium* \times *Ainsworthii*, 'Oakwood variety,' and several fine *Odontoglossums*.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent *Cypripedium niveum* *Wellesleyanum*, much larger than the ordinary form.

J. Bradshaw, Esq., Southgate, sent several fine *Lycaste Skinneri*.

Messrs. Linden, Brussels, showed a selection of rare Orchids.

M. Draps-Dom, Laeken, Brussels, sent hybrid *Cypripediums* and *Odontoglossum crispum*.

O. O. Wrigley, Esq., Bury, Lancashire (gr. Mr. Rogers), showed the rare *Miltonia Warszewiczii* *alba* and *Odontoglossum* \times *Adrianæ* 'Marian Bruce.'

Diploma Competition.

Various exhibitors showed varieties of *Lycaste Skinneri*.

First Diploma: To *Lycaste Skinneri* 'Beauty,' from J. Bradshaw, Esq. (gr. Mr. Whitelegge). A very large blush-white flower with dark rose markings on the lips.

ORCHID COMMITTEE, APRIL 3, 1906.

Mr. J. GURNEY FOWLER in the Chair, and nineteen members present.

Awards Recommended:—

Gold Medal.

To Major G. L. Holford, C.I.E., C.V.O., Westonbirt, Tetbury (gr. Mr. Alexander), for a superb group.

Silver-gilt Flora Medal.

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for an effective group.

To J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge), for a fine group.

Silver Flora Medal.

To Messrs. Sander & Sons, St. Albans, for an interesting group.

To Messrs. Charlesworth & Co., Bradford, for a group of hybrids &c.

To Messrs. Cypher & Sons, Cheltenham, for a group of *Odontoglossums* &c.

Silver Banksian Medal.

To Messrs. Hugh Low, for a group.

To M. Chas. Vuylsteke, Loochristy, Ghent, for hybrid *Odontoglossums*.

Lindley Medal (Silver).

To Mr. H. J. Chapman (gr. to Norman C. Cookson, Esq.), for a grand specimen of *Phaius* \times *Cooksonii* with seventeen spikes.

First-class Certificate.

To *Brasso-Cattleya* × 'The Baron' (*B. Digbyana* × *C.* × 'Lord Rothschild') (votes, unanimous), from Messrs. Sander & Sons. A very large and beautiful flower, cream-white, delicately freckled with rose-purple; lip fringed.

To *Cymbidium* × *I'Ansoni* (nat. hyb.) (votes, unanimous), from Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young). Flowers large ivory-white, with indistinct purplish lines on the sepals and petals, and purple marking on the lip.



FIG. 72.—*CYMBIDIUM* × *I'ANSONI*. (*Journal of Horticulture*.)

Award of Merit.

To *Cattleya Trianaei* 'J. Gurney Fowler' (votes, unanimous), from Messrs. Sander & Sons. A very fine variety, with pale lavender-tinted sepals and petals and glowing crimson front to the lip.

To *Laelio-Cattleya* × *Hopkinsii* (*L.-C.* × *Pallas* × *L. tenebrosa*). Flowers large and showy, bright, rose-purple, with purplish-crimson lip.

To *Masdevallia* × *igneo-Estradæ* (*igneo* × *Estradæ*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A pretty and floriferous hybrid with cream-white flowers, the veining of which is light purple.

To *Laelio-Cattleya* × *illustris magnifica* (*L.-C.* × *Latona* × *C. Dowiana aurea*) (votes, unanimous), from Messrs. Charlesworth. Flowers reddish-purple, with an orange-shade; lip ruby red.

To *Cymbidium Lowianum*, 'Fir Grange variety' (votes, unanimous), from W. A. Bilney, Esq., Fir Grange, Weybridge (gr. Mr. Whitlock).



FIG. 73.—LÆLIO-CATTLEYA × HOPKINSII.

(To face page clxxvi.)

The best dark variety. Sepals and petals pale green, with purple lines; lip white, with a reddish-scarlet mark in front.

To *Odontoglossum* × *percultum* 'Meteor' (*Rolfeæ* × *ardentissimum*) (votes, 12 for, 2 against), from M. Chas. Vuylsteke. Flowers white tinged and blotched with purple.

Cultural Commendation.

To Colonel Rogers, D.S.O., Sevenoaks, for a fine *Dendrobium nobile*.

To Mr. Alexander (gr. to Major G. L. Holford, C.I.E., C.V.O.), for an immense specimen of *Cymbidium* × *eburneo-Lowianum*.

Other Exhibits.

Sir Trevor Lawrence, Bart., sent two fine spikes of *Phalaenopsis Aphrodite*, taken from a specimen with eighteen leaves which had been in his collection twenty-three years.

De Barri Crawshay, Esq. (gr. Mr. Stables), sent the handsomely blotched *Odontoglossum crispum* 'Queen of the Earth' and others.

The Marquis de Wavrin (gr. Mr. De Geeste) showed *Cattleya Forgetiana Hort.*, similar to *C. Brymeriana*.

Diploma Awards:—

Cymbidium (species).

First Diploma: To *Cymbidium Lowianum*, 'Fir Grange variety,' from W. A. Bilney, Esq.

Second Diploma: To *Cymbidium grandiflorum punctatissimum*, from Jeremiah Colman, Esq.

Cymbidium (hybrids).

First Diploma: To *Cymbidium I'Ansoni*, from Sir Frederick Wigan, Bart.

Second Diploma: To *Cymbidium* × *eburneo-Lowianum*, from Sir Trevor Lawrence, Bart.

Masdevallia (species).

First Diploma: To *Masdevallia Veitchiana grandiflora*, from Jeremiah Colman, Esq.

Masdevallia (hybrids).

First Diploma: To *Masdevallia* × Bocking hybrid, from Sir Trevor Lawrence, Bart.

Second Diploma: To *Masdevallia* × *igneo-Estradæ*, from Sir Trevor Lawrence, Bart.

ORCHID COMMITTEE, APRIL 17, 1906.

Mr. HARRY J. VEITCH in the Chair, and twenty members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a fine group of *Odontoglossums* &c.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group.

To C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), for a collection of *Odontoglossums* and other Orchids.

To Messrs. Low, Enfield, for a group.

First-class Certificate.

To *Brasso-Cattleya* × ‘Mrs. Francis Wellesley’ (*C. Lüddemanniana* × *B. Digbyana*) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A superb flower, eleven inches across the petals, and of a delicate rosy-lilac tint, the disc of the finely fringed lip being primrose colour, the bases of the sepals and petals white.

To *Lælio-Brasso-Cattleya* × *Veitchii* (*L. purpurata alba* × *B.-C.* × *Digbyano-Mossiae*) (votes, unanimous), from Messrs. Jas. Veitch, Chelsea. A large and finely formed flower; sepals and petals silver-white tinted with pale rose; lip fringed, ruby-purple in front, yellow in the centre.

To *Odontoglossum* × *amabile* ‘John Bradshaw’ (*crispum Calypso* × *crispo-Harryanum*) (votes, unanimous), from Messrs. Charlesworth.



FIG. 75.—*ODONTOGLOSSUM* × *AMABILE* ‘JOHN BRADSHAW.’ (*Journal of Horticulture*.)

Flowers white, tinged with purple, the inner two-thirds of the segments blotched with claret colour.

To *Odontoglossum* × *Ossulstoni* var. ‘W. H. Hatcher’ (*crispo-Harryanum* × *Pescatorei Charlesworthii*) (votes, unanimous), from Messrs. Charlesworth. A finely formed cream-white flower, heavily barred with purple; front of the lip white.

To *Lælio-Cattleya* × *callistoglossa*, ‘The Dell variety’ (*L. purpurata* × *C. Warszewiczii*) (votes, unanimous), from Baron Sir H. Schröder,



FIG. 74.—BRASSO-CATTLEYA × 'MRS. FRANCIS WELLESLEY.'

(To face page clxxviii.)

Bart. (gr. Mr. Ballantine). A fine flower, with lilac-tinted sepals and petals and purplish-crimson lip.

Award of Merit.

To *Laelio-Cattleya* × 'Baroness Schröder' var. *delicata* (*L. Jongheana* × *C. Trianaei*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander). Form of *L. Jongheana*, but the size of *C. Trianaei*; soft rose-pink, with orange lip, having a crimped rose margin.

To *Odontoglossum crispum* *Whateleyae* (votes, 12 for, 0 against), from Mr. H. Whateley, Kenilworth. Flower white, with purple spotting distributed as in *O.* × *Adrianæ*.

Botanical Certificate.

To *Dendrobium lasioglossum*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers white, with a downy crest to the lip and purple lines on the side lobes.

Cultural Commendation.

To Mr. H. G. Alexander, Orchid-grower to Major G. L. Holford, C.I.E., C.V.O., for a charming specimen of *Miltonia vexillaria superba* with over fifty flowers.

Other Exhibits.

Baron Sir H. Schröder, Bart., showed rare *Odontoglossums*.

De B. Crawshay, Esq., showed a fine selection of *Odontoglossum crispum*.

Messrs. Jas. Cypher staged a selection of Orchids.

M. Chas. Vuylsteke sent Hybrid *Odontoglossums*.

Norman C. Cookson, Esq., showed two very fine *Odontoglossum crispum*.

Diploma Awards:—

Odontoglossum crispum (spotted).

First Diploma: To *O. crispum* 'Rossendale,' from Norman C. Cookson, Esq., and J. Wilson Potter, Esq.

Second Diploma: To *O. crispum* 'Jeanette,' from J. Wilson Potter, Esq.

Odontoglossum crispum (unspotted).

First Diploma: To *O. crispum* 'Venus.'

Second Diploma: To *O. crispum* 'Lady Buchan,' both from De B. Crawshay, Esq.

Odontoglossum Pescatorei (spotted).

Second Diploma: To *O. Pescatorei Schröderianum*, from Baron Sir H. Schröder, Bart.

Odontoglossum triumphans.

First Diploma: To *O. triumphans* 'Lionel Crawshay,' from De B. Crawshay, Esq.

Odontoglossum (hybrid).

First Diploma: To *O. × Adriane aureum*, from Baron Sir H. Schröder, Bart.

ORCHID COMMITTEE, MAY 1, 1906.

Mr. J. GURNEY FOWLER in the Chair, and twenty-five members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Leopold de Rothschild, Esq., Gunnersbury Park, Acton (gr. Mr. G. Reynolds), for a very fine group of *Vanda teres*, bearing some hundreds of flowers.

To Messrs. Charlesworth, Bradford, for a group of hybrids.

Silver Flora Medal.

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a collection of rare Orchids.

To Messrs. Sander, St. Albans, for hybrid and other Orchids.

To Messrs. Cypher, Cheltenham, for a well-arranged group.

To Messrs. Hugh Low, Enfield, for a group of Dendrobiums and Cypripediums.

Silver Banksian Medal.

To Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White), for a collection of rare Orchids.

To the Hon. Walter Rothschild, M.P. (gr. Mr. Arthur Dye), for an interesting collection of Masdevallias.

To Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins), for a good collection of *Cypripedium bellatulum*, *C. niveum*, and other Cypripediums.

To De B. Crawshay, Esq., Rosefield, Sevenoaks, for finely grown *Odontoglossums*.

First-class Certificate.

To *Arachnanthe annamensis* (votes, unanimous), from the Royal Botanic Gardens, Glasnevin, Dublin (F. W. Moore, Esq., Curator). A very fine species introduced by Messrs. Sander from Annam. Flowers in ascending spikes, seven or eight, each three inches across; segments nearly equal, curved, yellow, blotched with brown; lip whitish, with purple markings. The flower bears some resemblance to a gigantic spider.

Award of Merit.

To *Chysis × Sedenii* (*Limminghei × bractescens*) (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). Flowers two inches across, white, wax-like, the petals tipped with rose.

To *Masdevallia ignea*, 'Burford variety' (votes, unanimous), from Sir Trevor Lawrence, Bart. A very large pale-yellow flower tinged with salmon red.

To *Cypripedium Rothschildianum*, 'Northaw variety' (votes, 10 for, 2 against), from J. B. Joel, Esq., Northaw, Potter's Bar (gr. Mr. May). A fine variety with very dark-coloured flowers.

To *Cymbidium* × *Colmanae* (*eburneo-Lowianum* × *eburneum Dayanum*) (votes, unanimous), from Jeremiah Colman, Esq., Gatton Park (gr. Mr. W. P. Bound). A reversion towards *C. eburneum*. Flowers ivory-white, with faint purple markings.

Botanical Certificate.

To *Epidendrum odoratissimum*, from Sir Trevor Lawrence, Bart. An old species with branched spikes of many greenish-white flowers, with purple streaks at the base of the lip.

Cultural Commendation.

To Mr. Hopkins (gr. to Francis Wellesley, Esq.), for *Cypripedium bellatulum*.

To Mr. Ballantine (gr. to Baron Schröder), for *Odontoglossum triumphans*, 'The Dell variety.'

Other Exhibits.

Baron Sir H. Schröder, Bart. (gr. Mr. Ballantine), showed a fine selection of *Odontoglossums*.

F. Menteith Ogilvie, Esq. (gr. Mr. Balmforth), sent *Cymbidium insigne*, Hort.

Several exhibitors sent varieties of *Odontoglossum crispum* &c.

Diploma Awards:—

Odontoglossum crispum (unspotted).

First Diploma: To *O. crispum* 'Venus.'

Second Diploma: To *O. crispum* 'White Empress.' Both from De B. Crawshay, Esq.

Odontoglossum crispum (spotted).

First Diploma: To *O. crispum* 'Eustace,' from Norman C. Cookson, Esq.

Second Diploma: To *O. crispum* 'Raymond Crawshay,' from De B. Crawshay, Esq.

O. luteo-purpureum.

First Diploma: To *O. luteo-purpureum Mossii*, from De B. Crawshay, Esq.

Second Diploma: To *O. luteo-purpureum sceptrum*, 'The Dell variety,' from Baron Sir H. Schröder, Bart.

Odontoglossum (hybrids).

First Diploma: To *Odontoglossum* × *excellens*, 'The Dell variety,' from Baron Sir H. Schröder, Bart.

Second Diploma: To *Odontoglossum* × *Coradinei mirabile*, from Baron Sir H. Schröder, Bart.

Cypripedium bellatulum.

First Diploma: To *C. bellatulum*, 'Exhims variety,' from J. Forster Alcock, Esq.

Second Diploma: To *C. bellatulum Wellesleyanum*, from Francis Wellesley, Esq.

Cypripedium niveum.

First Diploma: To *C. niveum* 'The Premier,' from Francis Wellesley, Esq.

Second Diploma: To *C. niveum* 'Purity,' from Jeremiah Colman, Esq.

Cypripedium concolor.

Second Diploma: To *C. concolor Sanderæ*, 'Westfield variety,' from Francis Wellesley, Esq.

ORCHID COMMITTEE, MAY 15, 1906.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood), for a small group of rare *Odontoglossums*.

Silver Flora Medal.

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White), for an interesting collection of *Epidendrums* and *Masdevallias*.

To H. S. Goodson, Esq., Putney (gr. Mr. Day), for a group.

To Messrs. Cypher, Cheltenham, for a group.

Silver Banksian Medal.

To C. J. Lucas, Esq., Warnham Court (gr. Mr. Duncan), for a group of *Odontoglossums*.

To Messrs. Hugh Low for a group.

Award of Merit.

To *Cattleya intermedia* 'White Queen' (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking. Flowers large, pure white, the labellum larger and more openly displayed than in other white forms.

To *Cypripedium* × 'Miss Louisa Fowler' *superbum* (*Chamberlainianum* × *insigne* var.) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). Upper sepal cream white at the margin, the central area emerald-green with dotted lines of chocolate purple; petals tinged with purple and bearing chocolate-coloured spots; lip pale rose.

To *Odontoglossum crispum aureum* 'Laburnum' (votes, unanimous), from Messrs. J. and A. A. McBean, Cooksbridge. Flowers large, canary-yellow, with a purple tint on the backs of the sepals.

Cultural Commendation.

To Mr. H. G. Alexander, gr. to Major G. L. Holford, C.I.E., C.V.O., for a grand plant of the fine white *Odontoglossum crispum*, 'Westonbirt variety,' with three spikes.



FIG. 76.—*CATILEYA INTERMEDIA* 'WHITE QUEEN.'

Other Exhibits.

Baron Sir H. Schröder, Bart. (gr. Mr. Ballantine), showed *Odontoglossum crispum Sanderianum*, for which he received a First-class Certificate May 12, 1885.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent the richly coloured *Cypripedium Laurenceanum hackbridgense* and other *Cypripediums*.

Col. Brymer, Dorchester (gr. Mr. Powell), showed *Cælogyne × Brymeriana* (*Dayana × asperata*).

Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young), showed *Odontoglossum tripudians* 'Cecil Grey.'

Major G. L. Holford sent *Cattleya Mossiæ Reineckiana*, 'Westonbirt variety.'

J. Gurney Fowler, Esq., showed *Odontoglossum × ardentissimum* 'Dorothy Fox.'

H. L. Bischoffsheim, Esq. (gr. Mr. Ellis), and R. I. Measures, Esq. (gr. Mr. Smith), showed cut examples of *Lælia purpurata*.

Diploma Awards.

Miltonia Vexillaria.

First Diploma: To *Miltonia vexillaria* 'Memoria G. D. Owen,' from Sir Frederick Wigan, Bart.

Second Diploma: To *Miltonia vexillaria magnifica*, from Jeremiah Colman, Esq.

Epidendrum radicans (hybrids).

First Diploma: To *Epiphronitis × Veitchii*, from Jeremiah Colman, Esq.

Second Diploma: To *Epidendrum × Boundii*, from Jeremiah Colman, Esq.

TEMPLE SHOW, MAY 29, 1906.

Mr. HARRY J. VEITCH in the Chair, and twenty-two members present.

Awards Recommended:—

Award of Merit.

To *Phaius × 'Doris'* (*Cooksoniæ × oakwoodiensis*) (votes, 11 for, 3 against), from Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Chapman). Flowers large and with a broad labellum, strongly indicating *P. Humblotii*, which was one of the parents of both the hybrids used in its production. Sepals and petals rose colour; lip reddish rose marked with claret colour and with a yellow crest.

To *Cattleya Mossiæ*, 'Jeremiah Colman' (votes, unanimous), from Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound). A fine variety with rose-pink sepals and petals and large labellum, displaying broad bands of white on each side, the middle being veined with purplish rose.

To *Masdevallia Harryana*, 'Gatton Park variety' (votes, unanimous), from Jeremiah Colman, Esq. Flowers large and of an intense reddish scarlet.

To *Cattleya Mendelii* 'Mercury' (votes, unanimous), from Messrs. Hugh Low & Co., Enfield. A grand form of typical *C. Mendelii*, with the front of the broad labellum of a bright carmine crimson colour.

To *Odontoglossum* × *percultum* 'Juno' (*Rolfæ* × *ardentissimum*) (votes, unanimous), from M. Jules Hye de Crom, Ghent. A model flower, cream-white, with a profusion of purplish-brown markings on the inner halves of the segments.

To *Odontoglossum* × *percultum* 'Orion' (*Rolfæ* × *ardentissimum*) (votes, unanimous), from M. Chas. Vuylsteke, Ghent. Flowers cream-white tinged with purple, the inner halves of the segments barred with dark purple;



FIG. 77.—*ODONTOGLOSSUM* × *PERCULTUM* 'ORION.' (*Journal of Horticulture*.)

Other Exhibits.

Jeremiah Colman, Esq. (gr. Mr. Bound), staged a large and effective group.

Sir Frederick Wigan, Bart. (gr. Mr. Young), staged an interesting group representing 25 genera, 57 species, 9 varieties of species, 29 hybrids, and an additional selection of cut spikes.

Mrs. Ernest Hill, Penshurst (gr. Mr. Ringham), exhibited a group of *Miltonia vexillaria*.

R. Ashworth, Esq., Newchurch, Manchester (gr. Mr. Pidsley), showed a collection of *Odontoglossums* &c.

J. Rutherford, Esq., Blackburn (gr. Mr. Lupton), sent white forms of *Cattleya Mossiæ*.

Messrs. Sander & Sons, St. Albans, staged a magnificent group in which were many new plants, including the fine blotched *Odontoglossum crispum* 'Leonard Perfect,' and *O.* × *ardentissimum* 'Countess of Tankerville.'

Messrs. Charlesworth & Co., Bradford, had a fine group.

Messrs. J. Cypher & Sons, Cheltenham, staged a group of *Odontoglossums*, *Lælias*, *Cattleyas*, &c.

Messrs. Wm. Bull, Chelsea, had a group in which was the rare *Cymbidium rhodochilum*.

Mr. J. Robson staged a group of Orchids.

The Hon. Walter Rothschild, M.P. (gr. Mr. Dye), sent *Brasso-Catt-lælia* × 'Tring Park Hybrid' (*L.-C. eximia Arnoldiana* × *B. Digbyana*).

W. J. Caparne, Esq., Guernsey, sent cut flowers of *Cattleya Mossiæ*.

Mrs. A. B. Collingwood, Alnwick (gr. Mr. Lovett), staged a group of *Vanda teres*.

Mr. Geo. Bronckart, Charleroi, Belgium, showed a collection of *Cymbidium insigne*.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed the finely coloured *Cypripedium Lawrenceanum hackbridgense* and *C. barbatum* 'King of Spain.'

M. F. Lambeau, Brussels, showed *Odontoglossum* × *Lambeauianum lucidum* and two others.

ORCHID COMMITTEE, JUNE 12, 1906.

Mr. GURNEY FOWLER in the Chair, and twenty members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Sir Frederick Wigan, Bart., Clare Lawn, East Sheen (gr. Mr. W. H. Young), for a group of *Cattleyas*, *Lælio-Cattleyas*, &c.

To H. S. Goodson, Esq., West Hill, Putney, for a group of showy species and hybrids.

To Messrs. Charlesworth, Bradford, for a group, principally hybrids.

Silver-gilt Banksian Medal.

To F. Menteith Ogilvie, Esq., Oxford (gr. Mr. Balmforth), for a group of *Cypripedium niveum*, *C. callosum Sanderæ*, &c.

Silver Flora Medal.

To Sir Trevor Lawrence, Bart., Burford (gr. Mr. W. H. White), for an interesting collection of rare species.

To Messrs. Sander, St. Albans, for a group.

To Messrs. Hugh Low, Enfield, for a group.

First-class Certificate.

To *Cattleya Mossiæ Reineckiana* 'The Baron' (votes, 15 for, 3 against), from Baron Sir H. Schröder, Bart., The Dell, Egham (gr. Mr. Ballantine). A very large variety; sepals and petals white; lip broad and fringed, the front marbled with purplish-crimson.

Award of Merit.

To *Cattleya Mendelii* 'Mrs. Frederick Knollys' (votes, unanimous), from Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins). A charming white variety with delicate blush-pink tint on the petals and lip.

To *Oncidium monachicum* (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). A large-flowered species of the *O. serratum* section, with brown flowers, the united edges of the fringed petals pale yellow.



FIG. 78.— ATTELEYA MENDELI 'MRS. FREDERICK KNOLLYS.'

To *Laelio-Cattleya* × 'Kathleen Grey' (*L.-C.* × *Canhamiana* × *L. tenebrosa*) (votes, unanimous), from Sir Frederick Wigan, Bart. Flowers of a rich reddish-rose with large purple labellum.

To *Thunia* × *Veitchiana*, 'Burford variety' (*Marshalliana* × *Bensoniæ*) (votes, unanimous), from Sir Trevor Lawrence, Bart. Flowers in drooping racemes, white, with crimson marking on the lip.

To *Odontoglossum crispum xanthotes* Walkeræ, from W. C. Walker, Esq., Winchmore Hill (gr. Mr. Bunney). A fine white form with a few orange-coloured blotches.

To *Phalænopsis violacea*, 'Heaton variety' (votes, unanimous), from Messrs. Charlesworth. A large form of typical *P. violacea*.

To *Lælio-Cattleya* × *Canhamiana* 'Meteor' (*L. purpurata* × *C. Mossiæ*) (votes, unanimous), from Messrs. Sander, St. Albans. Flowers large, purplish-crimson, with claret-coloured front to the lip.

Botanical Certificate.

To *Lüddemannia Pescatorei*, from Miss Willmott, Warley Place, Great Warley (gr. Mr. Gooch). A very extraordinary species of the growth of *Acineta* and with a pendulous inflorescence four feet in length, the lower third bearing singular yellow flowers with reddish-purple marking on the sepals.

To *Quekettia Jenmanii*, from Sir Trevor Lawrence, Bart. A dwarf, tufted plant, with numerous whitish flowers.

To *Epidendrum confusum*, from Sir Trevor Lawrence, Bart. Resembling a large *E. fragrans*. Flowers cream-white with purple lines on the lip.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cypripediums* and *Lælio-Cattleyas*.

Jeremiah Colman, Esq. (gr. Mr. Bound), sent several *Lælio-Cattleyas*.

Baron Sir H. Schröder, Bart., showed *Cymbidium insigne* (Sanderi), 'The Dell variety.'

J. Gurney Fowler, Esq., showed a large form of *Lælio-Cattleya* × *Canhamiana*.

Diploma Awards:—

Cypripedium Lawrenceanum.

First Diploma: To *C. Lawrenceanum hackbridgense*, from Francis Wellesley, Esq.

Second Diploma: To *C. Lawrenceanum* 'Marjorie,' from F. Menteith Ogilvie, Esq.

C. Lawrenceanum (hybrids).

First Diploma: To *C. × gigas Oxoniensis* (*Lawrenceanum* × *Harrisianum superbum*), from F. Menteith Ogilvie, Esq.

Second Diploma: To *C. × Maudiae* (*callosum Sanderæ* × *Lawrenceanum Hyeanium*), from F. Menteith Ogilvie, Esq.

Cattleya Mossiæ.

First Diploma: To *C. Mossiæ Reineckiana* 'The Baron,' from Baron Sir H. Schröder, Bart.

Second Diploma: To *C. Mossiæ Wageri* 'Stella,' from F. Menteith Ogilvie, Esq.

Cattleya Mossiæ (hybrids).

First Diploma: To *Lælio-Cattleya* × *Hippolyta*, 'Gatton Park variety' (*L. cinnabarina* × *C. Mossiæ*).

Second Diploma: To *Lælio-Cattleya* × *Canhamiana alba*. Both from Jeremiah Colman, Esq.

ORCHID COMMITTEE, JUNE 26, 1906.

Mr. J. GURNEY FOWLER in the Chair, and nineteen members present.

Awards Recommended:—*Gold Medal.*

To Major G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander), for a fine group.

Silver-gilt Flora Medal.

To H. L. Bischoffsheim, Esq., The Warren House, Stanmore (gr. Mr. Ellis), for a group of *Cattleya Mossiæ* &c.

Silver Flora Medal.

To J. B. Joel, Esq., Northaw House, Potter's Bar (gr. Mr. May), for a group of *Cattleya Warscewiczii* and *Lælias*.

Silver Banksian Medal.

To Messrs. Hugh Low, Enfield, for a group.

First-class Certificate.

To *Sobralia Holfordi* (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). The finest of the *S. macrantha* section and distinguished by its very large labellum and the white base of the lip. Flowers deep rose-purple.

To *Cattleya* × *Whitei splendidissima* (*Warneri* × *Schilleriana*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. Sepals and petals rose-purple. Lip finely veined and tinged with ruby-purple, the disc orange and the margin lavender colour.

Award of Merit.

To *Sobralia* × *Amesiana* (*xantholeuca* × *Wilsoniana*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. Flowers large and of a delicate buff-yellow tinged with rose. The specimen bore ten flowers.

To *Thunia Marshalliana alba* (votes, unanimous), from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A fine albino of the pretty purplish-lipped species, which was also shown for comparison. Flowers in nodding racemes pure white with sulphur yellow disc to the lip.

To *Odontoglossum* × 'Queen Alexandra' var. 'Carmen' (*Harryanum* × *triumphans*) (votes, unanimous), from De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). A very dark and fine hybrid. Sepals and petals heavily blotched with dark-red brown; lip violet at base, white in front.

To *Cattleya Mossiæ* 'Mrs. A. Goodson' (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day). Flowers uniformly of

a rosy-purple tint, but colour suppression left the sepals nearly white, with a few rose-purple markings on the margin, and the petals mottled with white where the surface colour was wanting. A constant bizarre variety which has flowered similarly three years in succession.

Botanical Certificate.

To *Maxillaria molitor*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A rare Ecuadorean species of the *M. grandiflora* class. Flowers cream yellow, the sepals tinged with purple at the tips.



FIG. 79.—*ODONTOGLOSSUM* × 'QUEEN ALEXANDRA' VAR. 'CARMEN.'
(*Journal of Horticulture*.)

To *Houlletia odoratissima* var. *xanthina*, from Sir Trevor Lawrence, Bart. Flowers clear yellow with cream-white labellum.

To *Stelis muscifera*, from Sir Trevor Lawrence, Bart. A pretty species with semi-erect racemes of purple flowers.

To *Cirrhopetalum Amesianum*, from Sir Trevor Lawrence, Bart. A dwarf Malayan species with umbels of cream-white flowers marked with purple.

Other Exhibits.

Norman C. Cookson, Esq., Oakwood, Wylam (gr. Mr. Chapman), showed several fine blotched forms of *Odontoglossum crispum*, including *O. c. Mundyanum*, *Terpsichore*, *Sandera*, and *Medusa*.

Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins), sent *Cypripedium* × 'Miss Sillem' (*Godefroyæ* × *niveum*).

Messrs. Stanley, Southgate, sent fine varieties of *Cattleya Mossiæ*.

J. Hubert Grogan, Esq., Slaney Park, Co. Wicklow, sent a good dark form of *Odontoglossum Harryanum*.

ORCHID COMMITTEE, HOLLAND HOUSE, JULY 10, 1906.

Mr. HARRY J. VEITCH in the Chair, and twenty members present.

Awards Recommended:—

First-class Certificate.

To *Cypripedium* × *calloso-Rothschildianum* (*callosum* × *Rothschildianum*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis). A very fine hybrid, for which Mr. Gurney Fowler received an Award of Merit, August 10, 1897. The specimen bore two spikes, each with four large flowers. Dorsal sepal greenish-white with chocolate-purple lines; petals broad, cream-white, with dotted lines of chocolate-purple; labellum reddish-brown.

To *Cypripedium Godefroyæ leucochilum Hodgkinsonii* (votes, unanimous), from Messrs. Sander & Sons, St. Albans. A very large sulphur-yellow flower with the petals and dorsal sepal veined with purple.

To *Cattleya Warscewiczii* 'White Queen' (votes, unanimous), from W. P. Burkinshaw, Esq., Hessle, Hull. Sepals and petals pure white; lip dark rose, with yellow blotches at the sides, as in typical *C. Warscewiczii*.

To *Bulbophyllum virescens* (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). A large species allied to *B. Pahudii* and *B. Ericssonii*. Flowers in umbels, whitish, the sepals veined with pale green, and the lip and column tinged with purple.

Award of Merit.

To *Brasso-Cattleya* × 'Madame Hye' (*C. Harrisoniana* × *B. Digbyana*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). A pretty pale rose flower, with fringed edge to the distinctly three-lobed lip.

To *Aërides virens Sanderæ* (votes, unanimous), from Messrs. Sander & Sons. Flowers in racemes, pure white, fragrant.

To *Brasso-Cattleya* × *striata splendidissima* (*B. fragrans* × *C. Mossiæ*) (votes, unanimous), from Messrs. Sander & Sons. Flowers white, the large labellum having a yellow disc and pale rose apex.

To *Odontoglossum* × 'Eurydice' (*hastilabium* × *cirrhosum*) (votes, unanimous), from Messrs. Charlesworth & Co. A singular hybrid, with lanceolate sepals and petals, whitish, with red-brown bars; lip constricted in the middle, yellow at the base tinged with brown, and with the front lobe blush-white.

To *Cattleya* × 'F. W. Wigan,' 'Goodson's variety' (*Schilleriana* × *Dowiana aurea*) (votes, unanimous), from H. S. Goodson, Esq., Putney (gr. Mr. Day). A fine flower. Sepals and petals whitish tinged with purple; lip veined with rose-crimson.

To *Odontoglossum grande*, 'Zandhaghe variety' (votes, 12 for, 3 against), from H. Muller, Esq., Rotterdam. A strong-growing variety with some indication of *O. Schleiperianum*. Sepals and broader petals yellow barred with brown; lip cream-white with brown blotches.

To *Cattleya* × 'Mrs. Myra Peeters' (*Gaskelliana alba* × *Warneri alba*) (votes, unanimous), from M. A. A. Peeters, St. Gilles, Brussels. Flowers large, pure white, with yellow disc to the lip.

Botanical Certificate.

To *Hemipilia amethystina*, from Sir Frederick Wigan, Bart. (gr. Mr. W. H. Young). A pretty terrestrial Orchid, with a single roundish variegated leaf and an erect inflorescence of rose-coloured flowers.

Other Exhibits.

Sir Frederick Wigan, Bart., staged a fine group.

Major G. L. Holford, C.I.E., C.V.O., showed several rare Orchids.

Jeremiah Colman, Esq., had an extensive group.

Messrs. Sander & Sons staged a very fine group of rare species and hybrids.

Messrs. Hugh Low arranged an effective group.

Francis Wellesley, Esq., showed *Cattleya Gaskelliana* 'Mrs. De B. Crawshay,' of a pale rosy-lilac.

M. A. A. Peeters sent the fine white *Cattleya* × 'Mrs. Myra Peeters.'

W. Thompson, Esq., showed *Odontoglossum Crawshayanum*, 'Walton Grange variety.'

ORCHID COMMITTEE, JULY 17, 1906.

Mr. J. GURNEY FOWLER in the Chair, and eleven members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Hugh Low, Enfield, for a group.

To Messrs. Stanley, Southgate, for a group.

First-class Certificate.

To *Aërides Houlettianum*, 'Fowler's variety' (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis). The finest of the *A. falcatum* section. Flowers in racemes of twenty or more, large and fragrant; sepals and petals light buff-yellow, tipped with purplish-rose; lip broad, cream-white, with purplish-rose; wedge-shaped blotch at the apex of the front lobe, which is fringed.

Award of Merit.

To *Lycaste tricolor albens* (votes, 8 for, 3 against), from J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge). A singular little Guatemalan species, sometimes greenish, slightly tinged with rose, but in the present instance having pale-green sepals, and white petals and lip.

Cultural Commendation.

To Mr. G. G. Whitelegge (gr. to J. Bradshaw, Esq.), for two plants of *Lycaste tricolor*, one with sixteen and the other twenty-four flowers.

Other Exhibits.

R. I. Measures, Esq., Camberwell (gr. Mr. Smith), showed *Cypripediums*.

J. Gurney Fowler, Esq., sent *Cypripedium* × 'Mrs. Rehder,' 'Glebelands variety.'

Messrs. Duchesne, Lanthoine, & Co., Watermael, Brussels, sent a good variety of *Odontoglossum* × *Vuykstekei*.

ORCHID COMMITTEE, JULY 31, 1906.

Mr. J. GURNEY FOWLER in the Chair, and sixteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group of hybrid Orchids, *Cattleya Warscewiczii* and *Disa grandiflora*.

To Messrs. Charlesworth, for a group of hybrid *Odontoglossums* &c.

Silver Banksian Medal.

To Major G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. H. G. Alexander), for a collection of fine hybrid Orchids, all raised at Westonbirt.

To R. I. Measures, Esq., Camberwell (gr. Mr. Smith), for a collection of *Anæctochili*.

To Messrs. Hugh Low, for a group.

To Messrs. Stanley, for a group.

First-class Certificate.

To *Cattleya* × 'Lord Rothschild,' 'Westonbirt variety' (*Gaskelliana* × *Dowiana aurea*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). Flower equal to a good *C. labiata*, bright purplish-rose, with the centre and base of the lip orange, the front ruby-crimson.

To *Odontoglossum* × *crispo-Harryanum* 'Rosslyn variety' (*crispum* × *Harryanum*) (votes, unanimous), from H. T. Pitt, Esq. (gr. Mr. Thurgood). The largest form. Flowers white, the sepals and petals blotched with purple, and the base of the lip with violet colour.

To *Cattleya Warscewiczii saturata* (votes, unanimous), from Messrs. Sander, St. Albans. A fine rich rose variety, with large ruby-purple labellum, from which the yellowish patches usually seen on the lip of the species were almost obliterated.

To *Cattleya* × 'Claudian' (*Lüddemanniana* × *Schilleriana*) (votes, unanimous), from Messrs. Charlesworth. The largest of the *C. Schilleriana* hybrids. Flowers rose colour, with a fine veining of rose-purple on the lip.

Award of Merit.

To *Cattleya* × 'Atalanta' 'Fowler's variety' (*Leopoldii* × *Warscewiczii*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. J. Davis). A pretty hybrid and a remarkable colour variation from the type. Flowers purplish-rose, with rose-crimson labellum.

To *Cattleya* × *Ashtonii* 'Westonbirt variety' (*Harrisoniana* × *Warscewiczii*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. A very large form, light-rose in colour, with dark-rose mottling on the lip.

To *Sophro-Lælia* × 'Phroso' (*L. Jongheana* × *S.-L. × læta Orpetiana*) (votes, unanimous), from Major Holford, C.I.E., C.V.O. A pretty dwarf hybrid, with flowers of a glowing light-purple, with orange base and disc to the lip.

To *Odontoglossum* × *Fletcherianum* (*Edwardii* × *cirrhosum*) (votes, unanimous), from Messrs. Sander, St. Albans. Inflorescence branched, flowers formed in a great degree like *O. cirrhosum*, claret-purple with pale-rose, apiculate, recurved tips; lip one-third shorter than the petals, claret colour at the base, light-rose in front; callus yellow.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent *Cattleya Eldorado* 'Orange Queen' and two hybrid *Lælio-Cattleyas*.

J. Gurney Fowler, Esq., sent *Cypripedium* × *I'Ansonii*, which had already received a First-class Certificate.

De B. Crawshay, Esq., sent *Zygopetalum* × *Crawshayanum* 'Theodora.'

ORCHID COMMITTEE, AUGUST 14, 1906.

Mr. H. J. VEITCH in the Chair, and fourteen members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander & Sons, St. Albans, for a group of *Lælio-Cattleya* × *blechleyensis* and other Orchids.

To Messrs. Charlesworth & Co., Bradford, for hybrid Orchids &c.

Silver Banksian Medal.

To R. I. Measures, Esq., Camberwell (gr. Mr. Smith), for a collection of interesting species of Orchids.

To Messrs. Hugh Low, for a group.

To Messrs. Stanley, for a group.

Award of Merit.

To *Cypripedium* × *Harri-Leeanum*, 'Park Lodge variety' (*Harrisianum superbum* × *Lecanum* var.) (votes, unanimous), from E. Roberts, Esq., Park Lodge, Eltham (gr. Mr. W. Carr). Dorsal sepal large, and bearing many feathered blackish-purple lines and a bright rose-tint extending to the clear white margin; petals and lip broad and heavily tinged with reddish-purple.

Botanical Certificate.

To *Cynoches Egertonianum viride*, from Sir Trevor Lawrence, Bart. (gr. Mr. W. H. White). A singular species with a long raceme of pale-green flowers.

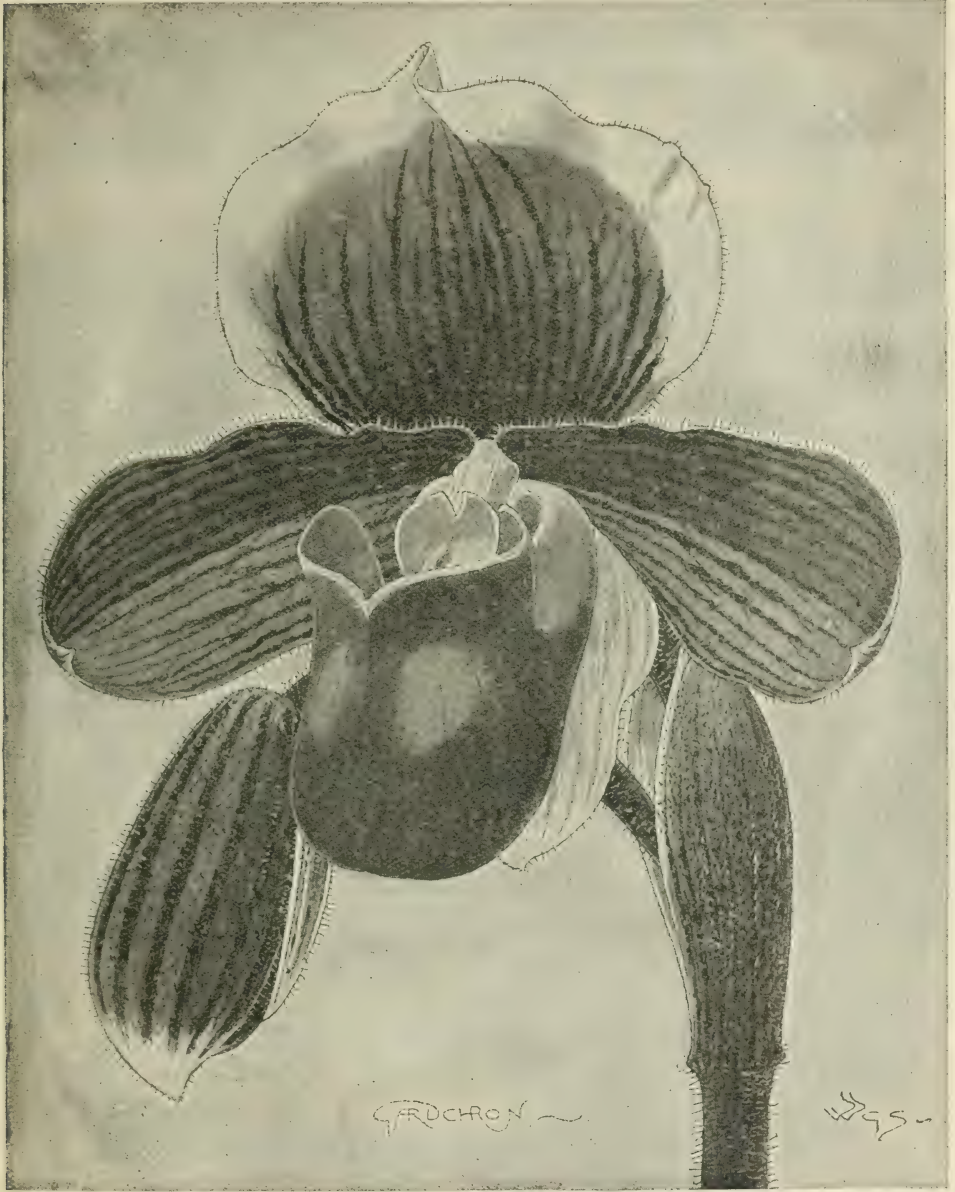


FIG. 80.—*CYPRIPEDIUM* × *HARRI-LEEANUM*, 'PARK LODGE VARIETY.' (*Gardeners' Chronicle*)

Cultural Commendation.

To Mr. H. G. Alexander (gr. to Major G. L. Holford, C.I.E., C.V.O.), for a fine example of *Odontoglossum* × *crispo-Harryanum*. The leading

bulb bore two spikes, 5 feet 6 inches in length, the one with twenty-four flowers, the other having eleven branches bearing forty-nine flowers.

To Mr. W. H. White (gr. to Sir Trevor Lawrence, Bart.), for *Platyclinis filiformis*, with about one hundred spikes.

Diploma Awards :—

Lælio-Cattleya × *elegans* and hybrids.

First Diploma: *Lælio-Cattleya* × *elegans* *Turneri*, from J. Gurney Fowler, Esq.

Second Diploma: *Lælio-Cattleya* × 'Berthe Fournier,' from Messrs Charlesworth.

Cattleya Warscewiczii and hybrids.

First Diploma: *Lælio-Cattleya* × *Nysa gloriosa*, from Jeremiah Colman, Esq.

Second Diploma: *Lælio-Cattleya* × *bletchleyensis*, from Jeremiah Colman, Esq.

Other Exhibits.

Sir Trevor Lawrence, Bart., showed a small group of rare Orchids.

J. Gurney Fowler, Esq. (gr. Mr. Davis), showed *Cattleya* × *Wavriniana* in fine condition, and other hybrids.

C. J. Lucas, Esq. (gr. Mr. Duncan), staged a small group of hybrids.

F. Du Cane Godman, Esq. (gr. Mr. Moody), sent *Satyrium carneum*.

M. Jules Hye de Crom, Ghent, showed *Miltonia* × *Hyeana* (× *Blenana* × *vexillaria Leopoldii*).

ORCHID COMMITTEE, AUGUST 28, 1906.

Mr. J. GURNEY FOWLER in the Chair, and thirteen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Bradford, for a group of hybrid Orchids.

Silver Flora Medal.

To Messrs. Sander, St. Albans, for a group in which fourteen spikes of *Arachnanthe Lowii* were displayed.

To Jeremiah Colman, Esq. (gr. Mr. Bound), for a group principally of *Lælio-Cattleya* × *Nysa*.

Silver Banksian Medal.

To R. I. Measures, Esq., Camberwell (gr. Mr. Smith), for a group.

To Messrs. Hugh Low, for a selection of Cattleyas &c.

To Messrs. Stanley, Southgate, for a group.

First-class Certificate.

To *Cattleya* × *Iris* 'Countess of Morley' (*bicolor* × *Dowiana aurea*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr.

Alexander). Sepals and petals dark apricot-yellow; lip yellowish, with a clear rose front lobe.

Award of Merit.

To *Laelio-Cattleya* × *elegans* 'His Majesty' (*L. purpurata* × *C. Leopoldii*) (votes, unanimous), from Messrs. Sander, St. Albans. Sepals and petals purple; the tips of the side lobes and front of the lip claret-purple. The plant bore two spikes of twelve and nine flowers.

To *Cypripedium* × 'Baron Schröder' var. *ardens* (*œnanthum superbum* × *Fairrieanum*) (votes, unanimous), from Messrs. Sander. Dorsal sepal bearing heavy dark-purple dotted lines, and the whole flower suffused with rose colour.

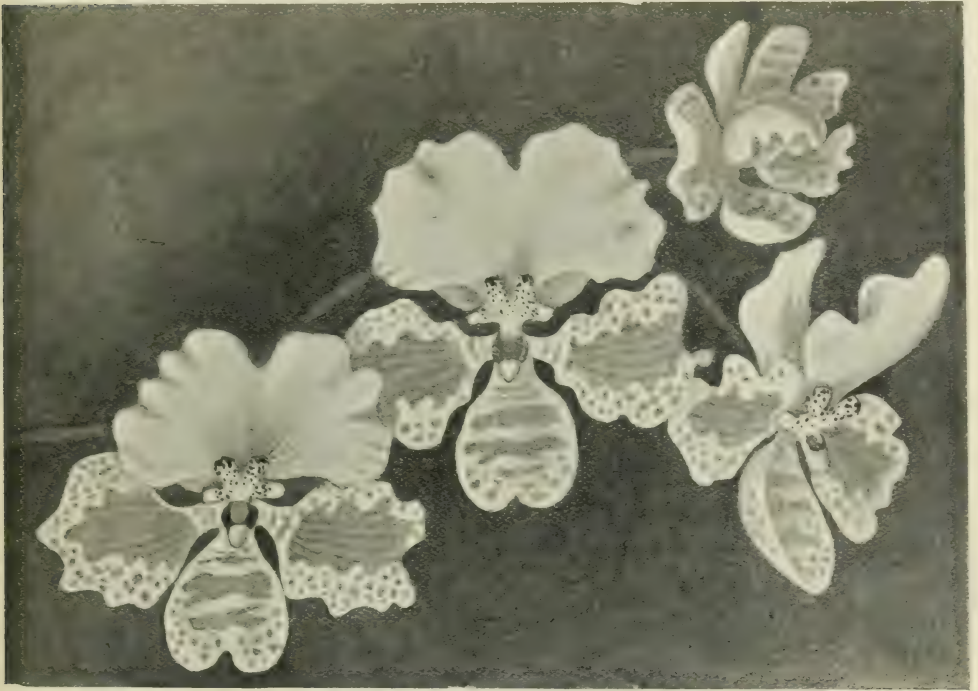


FIG. 81.—*ONCIDIUM STANLEYI*. (*Journal of Horticulture*.)

To *Sobralia Lowii* (votes, unanimous), from Henry Little, Esq., Twickenham (gr. Mr. Howard). A pretty dwarf species with small rose-purple flowers.

To *Oncidium Stanleyi* (votes, unanimous), from Messrs. Stanley, Southgate. A supposed natural hybrid between *O. curtum* and *O. Marshallianum*. Sepals and petals yellowish with light-brown markings; lip clear yellow.

Cultural Commendation.

To P. L. Hudson, Esq., Pampisford, for *Cypripedium Charlesworthii* with fifteen flowers.

Other Exhibits.

The Hon. Walter Rothschild, M.P. (gr. Mr. Dye), sent *Cattleya* × *Hardyana*, 'Tring Park variety' (F.C.C. 1894) and *Brasso-Cattleya* × 'Madame Chas. Maron.'

Major G. L. Holford, C.I.E., C.V.O., sent *Lælio-Cattleya* × 'Berthe Fournier' var. 'Mrs. Benson' and *Sophro-Cattleya* × *Chamberlainiana triumphans*.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent *Cattleya* × *vestalis*, 'Westfield variety,' and *Cattleya bicolor*, 'Westfield variety.'

R. G. Thwaites, Esq. (gr. Mr. Black), showed *Odontoglossum crispum xanthotes Charlesworthii*, in fine condition.

E. Roberts, Esq., Eltham (gr. Mr. Carr), showed *Cypripedium* × 'Olga Bagshaw.'

Colonel H. Cary Batten sent *Lycaste leucantha*.

ORCHID COMMITTEE, SEPTEMBER 11, 1906.

Mr. GURNEY FOWLER in the Chair, and thirteen members present.

Awards Recommended :—

Silver Flora Medal.

To H. S. Goodson, Esq., Fairlawn, West Hill, Putney (gr. Mr. Day), for a group.

To Messrs. Charlesworth, Heaton, Bradford, for a group of *Cattleya* × *Iris*, and other Orchids.

To Messrs. Sander, St. Albans, for a group of interesting species and hybrids.

To Messrs. Hugh Low, Enfield, for a group.

Award of Merit.

To *Lælio-Cattleya* × 'Sunset' (*L. Jongheana* × *C. Percivaliana*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O., Westonsbirt, Tetbury (gr. Mr. Alexander). A fine hybrid with large and perfectly formed flowers; sepals and petals of a delicate pale-lilac colour, with darker veining; lip orange-colour with a red-brown blotch in front, and a broad white, lilac-edged, crimped margin.

To *Lælio-Cattleya* × *woodfordiensis* (*L. crispa* × *L.-C.* × *C. G. Roebling*) (votes, unanimous), from J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis). Flowers with a general resemblance to those of *L.-C.* × *exoniensis*, but larger; sepals and petals white, tinged with pale lilac; disc of the lip yellow, front ruby-purple, with a lavender-coloured margin.

To *Lælio-Cattleya* × 'Mrs. de Vere Beauclerk' (*L.-C.* × *Ingramii* × *C. Trianaei*) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A dwarf hybrid with fine broad-petalled flowers; sepals and petals white, tinged and veined with lilac-colour, the petals being the darker; lip dark-orange with minute lines and spots of reddish-brown, the crimped front being claret colour with darker lines.

Botanical Certificate.

To *Polystachya grandiflora* from Sir Trevor Lawrence, Bart., Burford (gr. Mr. White). A singular species from tropical Africa, with the largest flowers of any of the genus; flowers borne in succession on erect spikes, each one inch and a half long, greenish-white tinged with purple, and with purple markings on the lip.

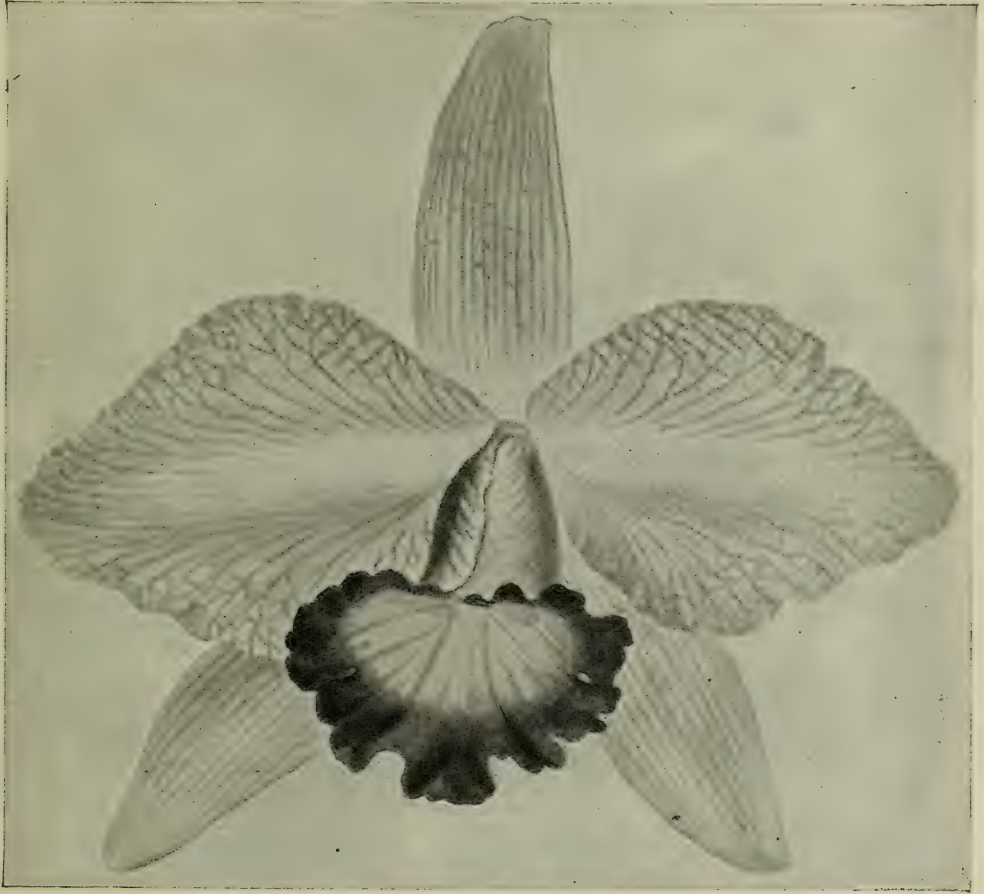


FIG. 82.—*LÆLIO-CATTELEYA* × 'MRS. DE VERE BEAUCLERK.'

Other Exhibits.

Francis Wellesley, Esq., again showed the beautiful *Brasso-Cattleya* × 'Mrs. Francis Wellesley' (F.C.C. April 17, 1906).

Jeremiah Colman, Esq.; Gatton Park (gr. Mr. Bound), showed a pretty hybrid between *Cattleya bicolor* and *C. × Iris*.

ORCHID COMMITTEE, SEPTEMBER 25, 1906.

Mr. J. GURNEY FOWLER in the Chair, and seventeen members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Charlesworth & Co., Heaton, Bradford, for a group of *Cattleya* × *Iris* and other Orchids.

Silver Flora Medal.

To Messrs. Sander & Sons, St. Albans, for a group of *Lælio-Cattleyas*, *Cypripediums*, &c.

Silver Banksian Medal.

To Messrs. Cypher & Sons, Cheltenham, for a group.

Award of Merit.

To *Lælio-Cattleya* × ‘Berthe Fournier,’ ‘Holford’s variety’ (*L.-C.* × *elegans* × *C. Dowiana aurea*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). Flowers deep copper-rose colour with ruby-crimson lip, having gold lines at the base.

To *Cypripedium* × ‘Victory’ (*Euryale* × *triumphans*) (votes, 9 for, 4 against), from Messrs. Sander & Sons. Flower nearest to *C. triumphans*. Dorsal sepal white with a green base and marginal flush of rose colour, the middle area bearing heavy chocolate blotched lines, which change to rose colour on the upper part.

To *Cattleya* × *Hardyana* ‘Rex’ (*Warscewiczii* × *Dowiana aurea*) (votes, unanimous), from the Marquis de Wavrin, Somerghem, Belgium (gr. Mr. De Geest). A very fine dark variety, with intense ruby claret-coloured lip.

To *Cypripedium* × *Fletcherianum* (*Godefroyæ leucochilum* × ‘W. R. Lee’ var. ‘Lord Derby’) (votes, unanimous), from Messrs. Hugh Low. Flowers large, cream-yellow with heavy blotched lines of dark chocolate-purple colour; lip pale yellow.

To *Dendrobium* × ‘Arthur Ashworth’ (*Brymerianum* × *Dalhousieanum*) (votes, unanimous), from Elijah Ashworth, Esq., Harefield Hall, Wilmslow (gr. Mr. Holbrook). Flowers light yellow, with purple markings on the base of the fringed labellum.

To *Odontioda* × *Bohnhoffiæ* (*Cochlioda vulcanica* × *Odontoglossum cirrhosum*) (votes, unanimous), from Messrs. Charlesworth. Flowers with narrow segments, as in *O. cirrhosum*; bright red, with a slight purple tint at the base, and whitish markings towards the ends of the segments.

Botanical Certificate.

To *Trevoria Chloris*, from Elijah Ashworth, Esq. (gr. Mr. Holbrook). A new genus named in honour of Sir Trevor Lawrence, Bart. Flowers 2 inches at widest, in drooping racemes, greenish with white lip; fragrant.

Diploma Awards:—

Cypripedium Rothschildianum (hybrids).

First Diploma: To *Cypripedium* × *Fletcherianum*, from Messrs. Hugh Low.

Second Diploma: To *Cypripedium* × *A. de Lairese* 'Westfield variety,' from Francis Wellesley, Esq.



FIG. 83.—*CYPRIPEDIUM* × *FLETCHERIANUM*. (*Gardeners' Chronicle*.)

Other Exhibits.

Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander), showed several new hybrid Orchids.

Francis Wellesley, Esq. (gr. Mr. Hopkins), sent the singular *Epicattleya* × 'Figaro' (*E. falcatum* × *C. intermedia*).

W. M. Appleton, Esq., Weston-super-Mare, sent hybrid *Cypripediums*.

Mr. H. Schuster, Brussels, showed a selection of *Lælio-Cattleyas* including *Lælio-Cattleya* \times *bellula* (*L. pumila* \times *C. maxima*).

ORCHID COMMITTEE, OCTOBER 9, 1906.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended:—

Silver Flora Medal.

To Messrs. Sander & Sons, St. Albans, for a group of hybrids &c.

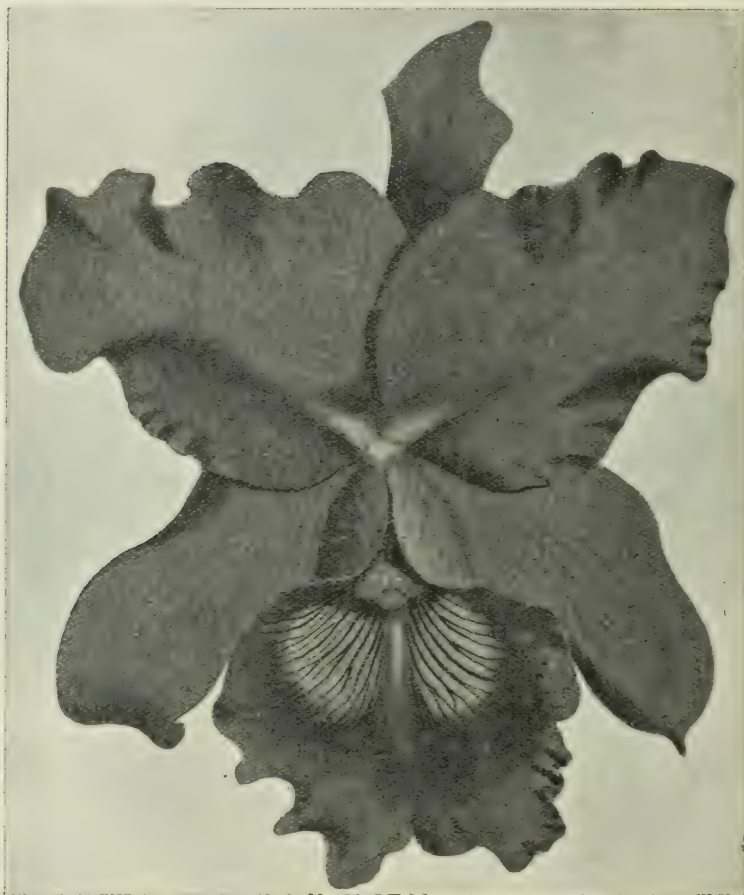


FIG. 84.—CATTLEYA \times 'MRS. J. W. WHITELEY,' 'ROSSLYN VARIETY.'
(*Journal of Horticulture.*)

Silver Banksian Medal.

To R. I. Measures, Esq., Camberwell (gr. Mr. Smith), for a group.

To Messrs. Heath & Sons, Cheltenham, for *Dendrobiums* and *Cypripediums*.

First-class Certificate.

To *Cymbidium erythrostylum* (votes, unanimous), from J. Gurney Fowler, Esq. (gr. Mr. Davis), and J. Bradshaw, Esq. (gr. Mr. Whitelegge). A graceful new species of the *C. eburneum* section. Flowers five to seven on a spike, white with a slight blush tint; lip yellowish with red lines.

To *Cattleya* × 'Mrs. J. W. Whiteley,' 'Rosslyn variety' (*Bowringiana* × *Hardyana*) (votes, 14 for, 2 against), from H. T. Pitt, Esq., Rosslyn, Stamford Hill (gr. Mr. Thurgood). Flowers large; sepals and petals bright magenta-rose; lip ruby-crimson with gold lines.

Award of Merit.

To *Lælio-Cattleya* × 'Phryne,' 'Gatton Park variety' (*L. xanthina* × *C. Warscewiczii*) (votes, unanimous), from Jeremiah Colman, Esq. (gr. Mr. W. P. Bound). Sepals and petals canary yellow; disc of the lip bright yellow, front dark-rose colour.

To *Miltonia Clowesii rosefieldiensis* (votes, 12 for, 1 against), from De B. Crawshay, Esq., Rosefield, Sevenoaks (gr. Mr. Stables). A large and finely coloured form.

To *Cattleya* × *Hardyana* 'The Queen' (nat. hyb.) (votes, unanimous), from Messrs. Rochford & Sons, Turnford, Cheshunt. Flowers cream colour with dark claret-purple lip veined with orange colour.

To *Lælio-Cattleya* × 'G. G. Whitelegge' (*L.-C.* × *callistoglossa* × *C. Hardyana*) (votes, unanimous), from J. Bradshaw, Esq. (gr. Mr. Whitelegge). Flowers larger than *L.-C. callistoglossa*, but similar in shape; sepals and petals white, tinged with lilac; lip claret-purple with gold lines.

Cultural Commendation.

To Mr. H. G. Alexander, orchid grower to Major G. L. Holford, C.I.E., C.V.O., for a fine specimen of *Cattleya* × *Hardyana*.

To Mr. Fisher, gr. to A. Huth, Esq., Putney, for a fine specimen of *Odontoglossum grande*.

Other Exhibits.

Francis Wellesley, Esq. (gr. Mr. Hopkins), showed *Cattleya* × *Mantini* 'The Premier' and *C.* × 'Mrs. Frederick Knollys' (*granulosa* *Buyssoniana* × *C. Bowringiana*).

Jeremiah Colman, Esq. (gr. Mr. Bound), showed a selection of hybrid Orchids.

De B. Crawshay, Esq. (gr. Mr. Stables), sent hybrid *Miltonias*.

ORCHID COMMITTEE, OCTOBER 23, 1906.

Mr. J. GURNEY FOWLER in the Chair, and eighteen members present.

Awards Recommended :—*Gold Medal.*

To Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander), for a magnificent group.

Silver-gilt Flora Medal.

To Jeremiah Colman, Esq. (gr. Mr. Bound), for an extensive group, principally hybrids.

To Messrs. Charlesworth & Co., Bradford, for a group of *Lælio-Cattleyas* &c.

Silver Flora Medal.

To Sir Trevor Lawrence, Bart. (gr. Mr. White), for a group of rare Orchids.

To Sir Frederick Wigan, Bart. (gr. Mr. Young), for a group of *Cattleyas* &c.

To H. S. Goodson, Esq., Putney (gr. Mr. Day), for a fine group.

To Messrs. J. Cypher & Sons, Cheltenham, for a group in which were a fine lot of *Cypripedium Fairrieanum*.

Silver Banksian Medal.

To R. I. Measures, Esq., Camberwell (gr. Mr. Smith), for a group.

To Messrs. Hugh Low & Co., for a group.

First-class Certificate.

To *Cypripedium* × 'Muriel Hollington' (*niveum* × *insigne*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. Young). The typical variety which received an Award of Merit, November 11, 1890. Flowers white, wax-like, with some light purple markings.

To *Cattleya* × 'Octave Doin' var. 'Herbert Goodson' (*Mendelii* × *Dowiana aurea*) (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day). Sepals and petals white, delicately mottled with lavender colour; lip crimson-purple with orange disc and reddish lines at the base.

To *Cattleya labiata* 'Peeters' variety' (votes, unanimous), from M. A. A. Peeters, Brussels. Flowers rose-purple with some white markings on the sepals and petals. Award of Merit, November 27, 1894.

Award of Merit.

To *Brasso-Cattleya* × 'Mrs. J. Leemann' *inversa* (*B. Digbyana* × *C. Dowiana aurea*) (votes, unanimous), from R. G. Thwaites, Esq., Streatham (gr. Mr. Black). The first hybrid with *Brassavola Digbyana* as a seed parent to be shown. Flowers sulphur-yellow with rosy-lilac front to the lip which had reddish lines at the base.

To *Dendrobium Phalaenopsis* 'Phyllis Moore' (votes, unanimous), from G. F. Moore, Esq., Bourton-on-the-Water (gr. Mr. Page). A pretty white variety, with a pink tint on the lip.

Botanical Certificate.

To *Pleurothallis velaticaulis*, from R. I. Measures, Esq. (gr. Mr. Smith). Plant tufted, a foot in height and bearing erect spikes of greenish flowers.

Cultural Commendation.

To Mr. W. H. White (gr. to Sir Trevor Lawrence, Bart.), for a batch of twenty-four scarlet *Habenaria militaris*, each with one to three spikes.

Diploma Awards:—

First Diploma: To *Cattleya Dowiana aurea* 'Westfield Beauty,' from Francis Wellesley, Esq. (gr. Mr. Hopkins). A fine yellow variety, with rose tint on the edges of the petals and claret-coloured lip veined with gold.

Cattleya Dowiana aurea (hybrids).

First Diploma: To *Cattleya* × 'Octave Doin' var. 'Herbert Goodson,' from H. S. Goodson, Esq.

Second Diploma: To *Cattleya* × *Mantini* *superbum*, from Jeremiah Colman, Esq.

Lælia pumila.

First Diploma: To *Lælia pumila superba*. A fine large form.

Second Diploma: To *Lælia pumila*, 'Gatton Park variety.' White, with slate-blue sides to the lip. Both from Jeremiah Colman, Esq.

Other Exhibits.

The Marquis de Wavrin, Somerghem, Belgium (gr. Mr. De Geest), sent *Cattleya* × 'Robert de Wavrin' (*Schrödera* × *Schilleriana*) and *C.* × *Wildemanni* (*velutina* × *Trianae* *alba*).

J. Gurney Fowler, Esq., sent *Cypripedium* × *Troilus*.

De B. Crawshay, Esq., sent *Odontoglossums* and two dark forms of *Miltonia spectabilis Moreliana*.

R. G. Thwaites, Esq., sent hybrid *Cattleyas*.

Messrs. Lager & Hurrell, New Jersey, U.S.A., showed *Cattleya* × *Ballantinei*.

ORCHID COMMITTEE, NOVEMBER 6, 1906.

Mr. J. GURNEY FOWLER in the Chair, and eighteen members present.

Awards Recommended:—

Gold Medal.

To G. F. Moore, Esq., Chardwar, Bourton-on-the-Water (gr. Mr. Page), for an extensive group in which the varieties of *Dendrobium Phalaenopsis* were remarkable.

To J. Bradshaw, Esq., The Grange, Southgate (gr. Mr. Whitelegge), for a fine group containing many white forms of *Cattleya labiata*.

Silver-gilt Flora Medal.

To Messrs. Charlesworth & Co., for a fine group of Hybrids and *Odontoglossums*.

Silver Flora Medal.

To J. Gurney Fowler, Esq., Glebelands, South Woodford (gr. Mr. Davis), for a group which included a fine *Vanda Sanderiana*.

To H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. Day), for a group.

To Messrs. Sander & Sons, for a group.

Silver Banksian Medal.

To Leopold de Rothschild, Esq., Gunnersbury House (gr. Mr. Hudson), for an effective arrangement of *Vanda cœrulea*, *Oncidium varicosum*, and other Orchids.

To Mrs. Spicer, 14 Aberdeen Park, Highbury, N., for a group of *Cypripedium Spicerianum*.

To R. I. Measures, Esq., Camberwell (gr. Mr. Smith), for a group.

To Messrs. J. W. Moore, Ltd., Rawdon, Leeds, for a group.

First-class Certificate.

To *Cattleya* × ‘Cleopatra’ (*superba* × *Dowiana aurea*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander). Habit of *Cattleya superba*, but with larger flowers which are bright rose with ruby-crimson front to the lip.

To *Cypripedium* × ‘Germaine Opoix,’ ‘Westfield variety’ (‘Madame Coffinet’ × *Fairrieanum*) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). A fine companion to *C.* × *Thalia* ‘Mrs. Francis Wellesley,’ which it resembles, and the best primary cross of *C. Fairrieanum*. Flowers large, upper sepal having numerous dotted blackish-purple lines on a yellowish ground, the margin being white; petals and lip yellowish tinged with purple-brown. Raised in the Gardens of the Palace of the Luxembourg by M. Octave Opoix.

To *Cattleya* × *Fabia superba* (*labiata* × *Dowiana aurea*) (votes, unanimous), from Sir Frederick Wigan, Bart. (gr. Mr. Young). Flowers bright rose with purplish-crimson lip, having gold lines at the base.

To *Cattleya labiata*, Captain J. F. Laycock (votes, unanimous), from Captain J. F. Laycock, Wiseton, Bawtry. A noble typical *C. labiata*, with purplish-rose flowers, having a ruby-purple front to the lip.

Award of Merit.

To *Cattleya* × *fulvescens delicata* (*Forbesii* × *Dowiana aurea*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. (gr. Mr. Alexander). Sepals and petals light greenish-buff tinged with rose; lip yellow with red-brown veining.

To *Cattleya* × *Fabia Bradshawia* (*labiata* × *Dowiana aurea*) (votes, unanimous), from J. Bradshaw, Esq. (gr. Mr. Whitelegge). Flowers bright magenta-rose, with ruby-purple lip with orange veining.

To *Cypripedium* × *nitens*, ‘Ball’s variety’ (*insigne* × *villosum*) (votes, 11 for, 2 against), from Major G. L. Holford, C.I.E., C.V.O.

To *Cattleya* × *Mantini*, ‘Fowler’s variety’ (*Bowringiana* × *Dowiana aurea*) (votes, unanimous), from J. Gurney Fowler, Esq. (gr. Mr. Davis). The darkest and finest-coloured variety. Flowers rosy-mauve colour, with maroon lip veined with gold.

To *Lælio-Cattleya* × ‘Golden Beauty’ (*L.-C.* × *Ernestii* × ‘Hy. Greenwood’) (votes, 10 for, 4 against), from Messrs. Sander & Sons. Flowers yellow with a ruby-red blotch on the lip.

To *Dendrobium Phalenopsis splendens* (votes, 11 for, 3 against), from W. M. Appleton, Esq., Weston-super-Mare. Flowers bright mauve, with white bases to the segments.

To *Cattleya* × *Marstersonia* *superba* (*Loddigesii* × *labiata*) (votes, 12 for, 2 against), from Messrs. J. W. Moore, Ltd., Rawdon, Leeds. Originally flowered by Messrs. Veitch in 1878. Flowers deep rose colour.



FIG. 85.—*CYPRIPEDIUM* × 'GERMAINE OPOIX,' 'WESTFIELD VARIETY.'
(*Journal of Horticulture*.)

Botanical Certificate.

To *Epidendrum floribundum*, from Sir Trevor Lawrence, Bart. Sepals and petals greenish; lip white with purple spots.

To *Mormodes Buccinator*, var. *theiochlorum*, from Sir Trevor Lawrence, Bart. (gr. Mr. White). A form with greenish flowers tinged with brown on the sepals.

To *Maxillaria nigrescens*, from Miss E. Willmott, Warley Place (gr. Mr. Gooch). Flowers with narrow segments, reddish-purple.

Cultural Commendation.

To Mr. G. G. Whitelegge (gr. to J. Bradshaw, Esq.), for a very large specimen of *Cattleya* \times *Mantini*.

To Mr. W. H. White (gr. to Sir Trevor Lawrence, Bart.), for a fine specimen of *Angraecum distichum*.

To Messrs. Sander & Sons, for *Cymbidium Tracyanum magnificum* with five spikes.

To Messrs. McBean, Cooksbridge, for *Cattleya Bowringiana* with twenty spikes.

Diploma Awards:—

Cattleya labiata.

First Diploma: To *Cattleya labiata*, 'Captain J. F. Laycock,' from Captain Laycock.

Second Diploma: To *Cattleya labiata* 'Hector,' from J. Bradshaw, Esq.

Cattleya labiata (hybrids).

First Diploma: To *Cattleya* \times *Fabia Bradshawia*, from J. Bradshaw, Esq.

Second Diploma: To *Cattleya* \times *Fabia*, 'Fowler's variety,' from J. Gurney Fowler, Esq.

Sophranitis grandiflora (hybrids).

First Diploma: To *Sophran-Cattleya* \times *eximia*, from J. Gurney Fowler, Esq.

Dendrobium Phalaenopsis.

First Diploma: To *Dendrobium Phalaenopsis* 'Miss Louisa Dean,' from G. F. Moore, Esq.

Other Exhibits.

Sir Trevor Lawrence, Bart., sent hybrid *Cattleyas*.

The Marquis de Wavrin sent *Cattleya* \times 'Adrienne de Wavrin' (*maxima* \times *Warscewiczii*).

Mr. Mertens, Ghent, sent hybrid Orchids.

Messrs. Hugh Low & Co. staged a group.

Messrs. Stanley Ashton & Co. showed a collection of *Cattleyas* &c.

Francis Wellesley, Esq., showed *Cypripedium* \times 'Sheba,' 'Westfield variety' (*Harrisianum superbum* \times *triumphans*). A fine dark hybrid, and others.

Jeremiah Colman, Esq., staged a selection of *Cattleya labiata* and hybrids.

ORCHID COMMITTEE, NOVEMBER 20, 1906.

Mr. J. GURNEY FOWLER in the Chair, and twenty-one members present.

Awards Recommended:—

Silver-gilt Flora Medal.

To Messrs. Charlesworth & Co., Heaton, Bradford, for a group of hybrid Orchids.

To Messrs. J. Cypher & Sons, Cheltenham, for a group of *Cypripediums*.

Silver Flora Medal.

To Messrs. Sander & Sons, St. Albans, for a good group.



FIG. 86.—*CYPRIPEDIUM* × *LEEANUM* 'CORONA'. (*Journal of Horticulture*.)

Bronze Banksian Medal.

To Messrs. Hugh Low & Co., Enfield, for a group.

First-class Certificate.

To *Cattleya* × *Fabia Goodsonii* (*labiata* × *Dowiana aurea*) (votes, unanimous), from H. S. Goodson, Esq., Fairlawn, Putney (gr. Mr. G. E.

Day). A very fine form with large magenta-rose flowers with ruby-crimson lip. The specimen bore two spikes of four and five flowers respectively.

Award of Merit.

To *Cypripedium* × *Lecanum* 'Corona' (*insigne* var. × *Spicerianum*) (votes, unanimous), from G. F. Moore, Esq., Chardwar, Bourton-on-the-Water (gr. Mr. Page). A fine form with large white dorsal sepal, bearing some purple lines and a green base.

To *Cypripedium* × 'Stephanos' (*Pollettianum* × *ananthum superbum*) (votes, unanimous), from the Rev. J. C. B. Fletcher, Mundham Vicarage, Chichester. Upper sepal white, with a green base and some feathered purple lines; petals and lip yellow, heavily tinged with brownish-purple.

Other Exhibits.

The Hon. Walter Rothschild, M.P. (gr. Mr. Dye), sent *Cattleya* × *Germania inversa*.

Francis Wellesley, Esq., Westfield (gr. Mr. Hopkins), sent several new hybrid Orchids.

Leopold de Rothschild, Esq. (gr. Mr. Hudson), showed the white *Vanda cœrulea albens*.

Major G. L. Holford, C.I.E., C.V.O., Westonbirt (gr. Mr. Alexander), showed the fine white *Cattleya labiata Amesiana* with five flowers on one spike.

J. Bradshaw, Esq., Southgate (gr. Mr. Whitelegge), sent *Odontoglossum* × *amabile Charlesworthii*.

From the Royal Horticultural Society's Gardens, Wisley, four forms of *Cypripedium* × *Euryades* were shown.

W. M. Appleton, Esq., Weston-super-Mare, sent *Cypripedium* × *Lecanum Appletonianum*.

M. Chas. Maron, Brunoy, France, showed two white forms of *Cattleya* × *Fabia*.

M. Mertens, Ghent, staged a small group.

Diploma Awards.

Cypripedium Fairricanum.

First Diploma: To *Cypripedium Fairricanum*, dark variety (Sander).

Cypripedium Fairricanum (hybrids).

First diploma: To *Cypripedium* 'Germaine Opoix,' 'Westfield var.' (*C.* × 'Madame Coffinet' × *C. Fairricanum*), from Francis Wellesley, Esq. (gr. Mr. Hopkins). The fine hybrid which secured a **F.C.C.** November 6.

To *Cypripedium* × 'Baron Schröder' *punctatum* (*ananthum superbum* × *Fairricanum*), from Francis Wellesley, Esq.

ORCHID COMMITTEE, DECEMBER 11, 1906.

Mr. HARRY J. VEITCH in the Chair, and nineteen members present.

Awards Recommended :—

Gold Medal.

To G. F. Moore, Esq., Chardwar, Bourton-on-the-Water (gr. Mr. Page), for a very fine group of *Cypripediums* &c.

Lindley Medal.

To Mr. C. J. Salter, gr. to Mrs. Haywood, Reigate, for eighteen large specimens of *Masdevallia tovarensis*, each with over one hundred spikes of white flowers.

Silver Flora Medal.

To Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound), for a group of *Cypripediums* and *Calanthes*.

To Messrs. Jas. Cypher & Sons, Cheltenham, for a fine group of *Cypripediums*.

To Messrs. Heath & Sons, Cheltenham, for a group of *Cypripediums*.

Silver Banksian Medal.

To Messrs. Sander & Sons, St. Albans, for a group.

To Messrs. J. W. Moore, Ltd., Rawdon, for a group.

Bronze Banksian Medal.

To R. I. Measures, Esq., Camberwell (gr. Mr. Smith), for a group.

First-class Certificate.

To *Cattleya* × *Dusseldorfei* 'Undine' (*intermedia alba* × *Mossia Wageneri*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O., Westonbirt, Tetbury (gr. Mr. Alexander). A pure white variety of good size.

To *Cypripedium* × *Actæus langleyense* (*insigne Sanderæ* × *Leeanum giganteum*) (votes, unanimous), from Major G. L. Holford, C.I.E., C.V.O. The variety raised by Messrs. Veitch, and to which an **A.M.** was given January 23, 1900. Flowers large, dorsal sepal pure white, with a small green base and a few purple lines.

To *Cypripedium* × *Troilus eboracicum* (*insigne* 'Harefield Hall' × *nitens* variety) (votes, 11 for, 4 against), from J. H. Craven, Esq., J.P., Keighley (gr. Mr. Corney). Flowers closely resembling *C. insigne* 'Harefield Hall.'

To *Cælogyne Mooreana* (votes, unanimous), from Messrs. Sander & Sons, St. Albans. A fine flower, pure white with yellow disc and papillæ on the lip, and as large as *C. cristata*.

Award of Merit.

To *Cymbidium* × *Wiganianum*, 'Westonbirt variety' (*eburneum* × *Tracyanum*) (votes, unanimous), from Major G. L. Holford. Flowers ivory-white, with dotted lines of light purple.

To *Brasso-Lalia* × 'Mrs. M. Gratrix,' 'Westfield variety' (*B. Digbyana* × *L. cinnabarina*) (votes, unanimous), from Francis Wellesley, Esq., Westfield, Woking (gr. Mr. Hopkins). Flowers of an almost uniform reddish-orange colour.

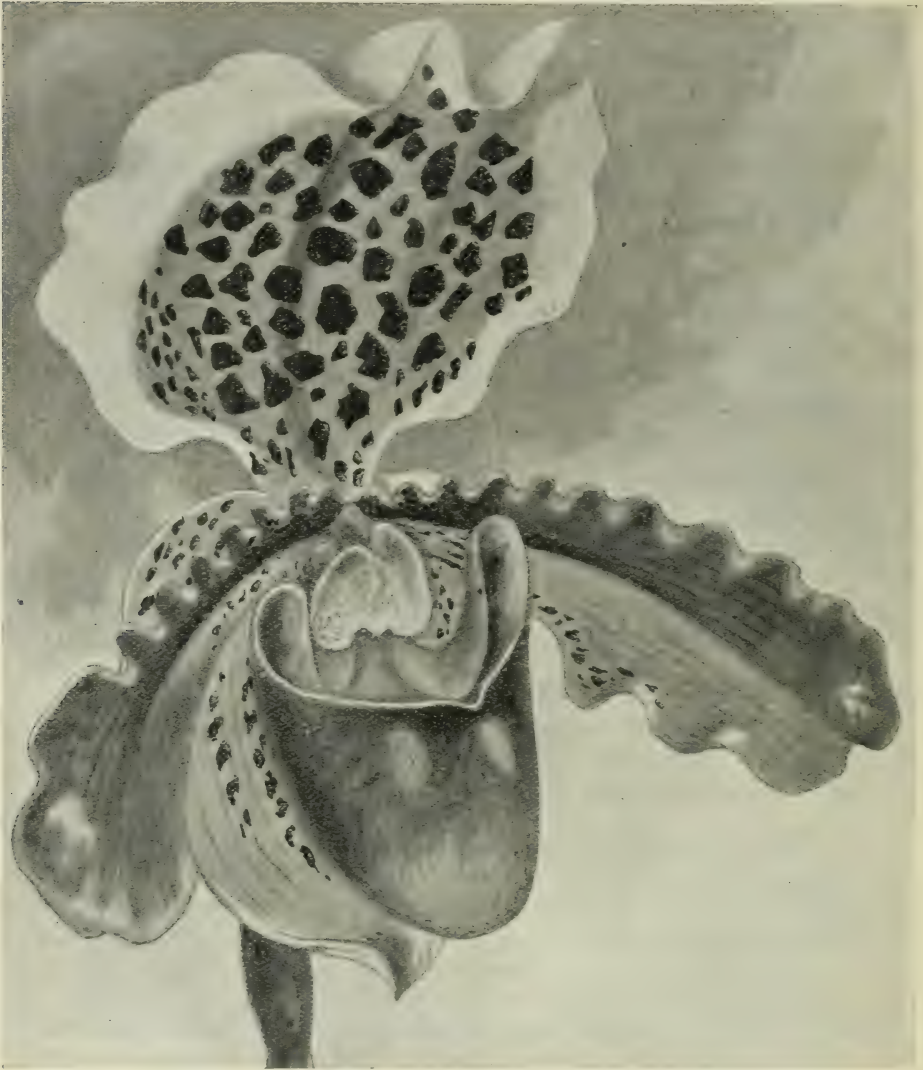


FIG. 87.—*CYPRIPEDIUM* × *EBORACUM*. (*Journal of Horticulture*.)

To *Dendrobium Phalaenopsis*, 'Gatton Park variety' (votes, unanimous), from Jeremiah Colman, Esq., Gatton Park (gr. Mr. Bound). Flowers white, with a slight slate-blue tint and veining of the same colour on the lip.

To *Odontoglossum* × *amabile* 'Glebelands variety' (*crispum* × *crispo-Harryanum*) (votes, unanimous), from J. Gurney Fowler, Esq.,

Glebelands, South Woodford. Flowers large, cream-colour, with dark, purple spots.



FIG. 88.—BRASSO-LELIA × 'MRS. M. GRATRUX,' 'WESTFIELD VARIETY.'

To *Cypripedium* × *Troilus*, 'Craven's variety' (*nitens* variety × *insigne* 'Harefield Hall') (votes, 12 for, 2 against), from J. H. Craven, Esq., J.P., Keighley (gr. Mr. Corney). A large flower of yellow colour, with blackish spotting on the dorsal sepal, which has a white tip.

To *Cypripedium* × *Actæus superbum* (*insigne Sanderæ* × *Lecanum*) (votes, unanimous), from Drewett O. Drewett, Esq., Riding-Mill-on-Tyne (gr. Mr. Renwick). Flowers greenish, with a large white dorsal sepal.

To *Cypripedium* × *Actæus* 'Bank House variety' (votes, 12 for, 2 against), from S. Briggs-Bury, Esq., Accrington (gr. Mr. Wilkinson). Petals and lip pale green; dorsal sepal white.

To *Odontioda* × *heatonensis* 'St. Vincent,' from Messrs. Charlesworth, Bradford (*O. cirrhosum* × *Cochlioda sanguinea*). Flowers small, white, spotted with carmine-rose.

Diploma Awards:—

Cypripedium Spicerianum (hybrids).

First Diploma: To *C. Niobe*, 'Oakwood variety,' from Francis Wellesley, Esq.

Second Diploma: To *C. Memnon* (*Spicerianum* × *Charlesworthii*), from S. Briggs-Bury, Esq., *Cypripedium insigne*.

First Diploma: To *C. insigne* 'Harefield Hall.'

Second Diploma: To *C. insigne Sanderæ*, both from Jeremiah Colman, Esq.

Cypripedium insigne (hybrids).

First Diploma: To *C. Thalia* 'Mrs. Francis Wellesley' (*insigne Chantinii* × 'Baron Schröder').

Second Diploma: To *C. Thalia giganteum*, both from Francis Wellesley, Esq.

Calanthe (hybrids).

First Diploma: To *C.* × 'Alpha.'

Second Diploma: To *C.* × *revertens*, both from Jeremiah Colman, Esq.

Other Exhibits.

J. Gurney Fowler, Esq., showed *Odontoglossum Wilckeanum* 'Fowler's variety.'

Francis Wellesley, Esq., sent a selection of fine hybrids.

The Earl of Tankerville sent *Cypripedium nitens*, 'Chillingham variety.'

Major G. L. Holford, C.I.E., C.V.O., showed *Lælio-Cattleya* × *rubens*, 'Pan variety.'

Messrs. Hugh Low staged a group.

R. G. Thwaites, Esq., sent *Sophro-Cattleya* × 'Doris.'

Messrs. Linden, Brussels, showed *Odontoglossum crispum* 'Madame Linden' and 'Jean Linden,' two finely blotched home-raised seedlings.

FORM OF RECOMMENDATION.

[This Form can be easily detached for use.]

THE ROYAL HORTICULTURAL SOCIETY.

Established
A.D. 1804.



Incorporated
A.D. 1809.

VINCENT SQUARE, WESTMINSTER, S.W.

Telegrams: "HORTENSIA, LONDON." Telephone No.: 5363, Westminster.

Form of Recommendation for a FELLOW of the ROYAL HORTICULTURAL SOCIETY.

Name

Description

Address

being desirous of becoming a FELLOW of the ROYAL HORTICULTURAL SOCIETY, we whose Names are underwritten beg leave to recommend him (her) to that honour; he (she) is desirous of subscribing *
Guineas a year.

Proposed by

Seconded by

* Kindly enter here the word *four* or *two* or *one*.

I would be a convenience if the Candidate's Card were sent at the same time.

Signed on behalf of the Council, this day of 190

..... CHAIRMAN.

[P.T.O.]

THE ROYAL HORTICULTURAL SOCIETY.

Privileges of Fellows.

- 1.—Anyone interested in Horticulture is eligible for election, and is invited to become a Fellow.
- 2.—Candidates for election are proposed by two Fellows of the Society.
- 3.—Ladies are eligible for election as Fellows of the Society.
- 4.—The Society being incorporated by Royal Charter, the Fellows incur no personal liability whatsoever beyond the payment of their annual subscriptions.
- 5.—Forms for proposing new Fellows may be obtained from the Offices of the Society, Vincent Square, Westminster, S.W.
- 6.—If desired, the Secretary will, on receipt of a letter from a Fellow of the Society suggesting the name and address of any lady or gentleman likely to become Fellows, write and invite them to join the Society.

FELLOWS.

A Fellow subscribing Four Guineas a year (or commuting for Forty Guineas) is entitled—

- 1.—To ONE Non-transferable (personal) Pass and FIVE Transferable Tickets admitting to all the Society's Exhibitions, and to the Gardens.
N.B.—Each Transferable Ticket or Non-transferable personal Pass will admit three persons to the Gardens at Wisley on any day *except* days on which an Exhibition or Meeting is being held, when each Ticket or Pass will admit One Person only. The Gardens are closed on Sundays, Good Friday, and Christmas Day.
- 2.—To attend and vote at all Meetings of the Society.
- 3.—To the use of the Libraries at the Society's Rooms.
- 4.—To a copy of the Society's JOURNAL, containing the Papers read at all Meetings and Conferences, Reports of trials made at the Gardens, and descriptions and illustrations of new or rare plants, &c.
- 5.—To purchase, at reduced rates, such fruit, vegetables, and cut flowers as are not required for experimental purposes.
- 6.—To a share (in proportion to the annual subscription) of such surplus or waste plants as may be available for distribution. Fellows residing beyond a radius of 35 miles from London (by the A B C Railway Guide) are entitled to a double share.
- 7.—Subject to certain limitations, to obtain Analysis of Manures, Soils, &c., or advice on such subjects, by letter from the Society's Consulting Chemist, Dr. J. A. Voelcker, M.A., F.I.C.
- 8.—To have their Gardens inspected by the Society's Officer at the following fees:—One day, £3. 8s.; two days, £5. 5s.; *plus* all out-of-pocket expenses.
- 9.—To exhibit at all Shows and Meetings, and to send seeds, plants, &c., for trial at the Society's Gardens.
- 10.—To recommend any ladies or gentlemen for election as Fellows of the Society.

A Fellow subscribing Two Guineas a year (or commuting for Twenty-five Guineas) is entitled—

- 1.—To ONE Non-transferable Pass and Two Transferable Tickets.
- 2.—To the same privileges as mentioned in Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.

A Fellow subscribing One Guinea a year, with an Entrance Fee of £1. 1s. (or commuting for Fifteen Guineas), is entitled—

- 1.—To ONE Transferable Ticket (in lieu of the non-transferable personal Pass), and the privileges mentioned in Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, as above.
[*Bona fide* Gardeners earning their living thereby, and persons living permanently abroad, are exempt from the payment of the Entrance Fee.]

ASSOCIATES.

An Associate subscribing 10s. 6d. a year is entitled—

- 1.—To ONE Non-transferable Pass, and to privileges as mentioned in Nos. 3, 4, and 9.
N.B.—Associates must be *bona fide* Gardeners, or employes in a Nursery, Private or Market Garden, or Seed Establishment, and must be recommended for election by Two Fellows of the Society.

Local Horticultural and Cottage Garden Societies may be Affiliated to the Royal Horticultural Society, particulars as to which may be had on application.

ESTABLISHED

1804.



INCORPORATED

1809.

ROYAL HORTICULTURAL SOCIETY,

VINCENT SQUARE, WESTMINSTER, S.W.

NOTICES TO FELLOWS.

- | | |
|--------------------------------------|--|
| 1. Notice to Fellows. | 17. Exhibitions, Meetings, and Lectures in 1907. |
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1. NOTICE TO FELLOWS.

A few pages of Notices to Fellows are always added at the end of each number of the JOURNAL, immediately preceding the Advertisements, and also at the beginning both of the "Book of Arrangements" and of the "Report of the Council." Fellows are particularly requested to consult these Notices, as it would often save them and the Secretary much needless correspondence.

2. LETTERS.

All letters on *all* subjects should be addressed—The Secretary, Royal Horticultural Hall, Vincent Square, Westminster, S.W.

3. TELEPHONE AND TELEGRAMS.

Telephone Number **5363, WESTMINSTER.**

"**HORTENSIA, LONDON,**" is sufficient address for telegrams.

4. JOURNALS WANTED.

The Secretary would be very greatly obliged for any back numbers of the JOURNAL, but especially for the following:—Vol. V., Part 1; Vol. VII., Part 2; Vol. X.; Vol. XIII., Part 1; Vol. XVI., Parts 2 and 3; Vol. XVII., Parts 1 and 2; Vol. XVII., Parts 3 and 4; Vol. XIX., Part 1; Vol. XIX., Part 2; Vol. XX., Part 3; Vol. XXII., Part 3; Vol. XXII., Part 4; Vol. XXV., Part 3; Vol. XXVI., Part 4; Vol. XXVII., Part 1; Vol. XXVII., Part 4; Vol. XXVIII., Parts 3 and 4; and Vol. XXIX., Parts 1, 2, and 3.

5. SUBSCRIPTIONS.

All Subscriptions fall due on January 1 of each year. To avoid the inconvenience of remembering this, Fellows can *compound* by the payment of one lump sum in lieu of all further annual payments, or they can, by applying to the Society, obtain a form of instruction to their bankers to pay for them every January 1. It may be a week or more before the Tickets reach the Fellow, owing to the very large number, nearly 20,000 having to be despatched within the first month of the year. Fellows who have not already given an order on their bankers for the payment of their subscriptions each year are requested to do so, as this method of payment is preferred, and saves the Fellows considerable trouble. Forms for the purpose may be obtained from the R.H.S. Offices at Vincent Square, Westminster, S.W. Fellows whose subscriptions remain unpaid are debarred from all the privileges of the Society; but their subscriptions are nevertheless recoverable at law, the Society being incorporated by Royal Charter.

In paying their subscriptions, Fellows often make the mistake of drawing their cheques for Pounds instead of for Guineas. Kindly note that in all cases it is Guineas and not Pounds. Cheques and Postal Orders should be made payable to "The Royal Horticultural Society" and crossed "London and County Bank, Westminster."

6. FORM OF BEQUEST.

I give and bequeath to the Treasurer for the time being of the Royal Horticultural Society, London, the sum of £ , to be paid out of such part of my personal estate as I can lawfully charge with the payment of such legacy, and to be paid free of legacy duty, within six months of my decease; the receipt of such Treasurer to be a sufficient discharge for the same. And I declare that the said legacy shall be applied towards [the general purposes of the Society].*

* Any special directions or conditions which the testator may wish to be attached to the bequest may be substituted for the words in brackets.

7. PRIVILEGES OF CHEMICAL ANALYSIS.

Instructions are contained at page 63 in the "Book of Arrangements," 1907.

8. LIST OF FELLOWS.

A list of all the Fellows of the Society is sent out in January. Fellows are requested to look at their own names in it, and if in any way these are incorrect, or the addresses insufficient, they are requested to inform the Secretary at once. Another use which all Fellows might make of this list is to consult it with reference to their friends' names, and if any of them are not found recorded therein they might endeavour to enlist their sympathies with the Society, and obtain their consent to propose them as Fellows forthwith. Forms of Nomination, and of the Privileges of Fellows, are bound in with every number of the JOURNAL and the "Book of Arrangements."

9. NEW FELLOWS.

On March 6 next the Society completes its 104th year, and before that day arrives, will all the Fellows do their best to extend the usefulness of the Society by enlisting the sympathy of all their friends and persuading them to join the ranks of the Society? A list of the privileges of Fellows will be found at page 14 in the "Book of Arrangements," and just a line addressed to the Secretary R.H.S., Vincent Square, Westminster, containing the name and address of the proposed new Fellow will suffice. Should it be preferred, the Secretary will, upon receipt of a postcard or letter giving the name and address of any persons likely to join the Society, write direct and invite them to allow their names to be proposed for election.

10. DONATIONS.

What has been accomplished for the Society since 1887 is largely due to the unwearied assistance afforded by a small proportion of the Fellows ; but as all belong to the same Society, so it behoves each one to do what he or she can to further its interests, especially by :—

1. Increasing the number of Fellows.
2. The gift of suitable instruments for the new Laboratory at Wisley, such as students' microscopes, magnifying lenses, microscopic slides, botanical dissecting instruments, lantern slides, &c.
3. Establishing a Prize Fund for Wisley Students.
4. Books to fill the gaps in the Library.
5. Supplying new and rare Plants for the Gardens and surplus roots for distribution to the Fellows.

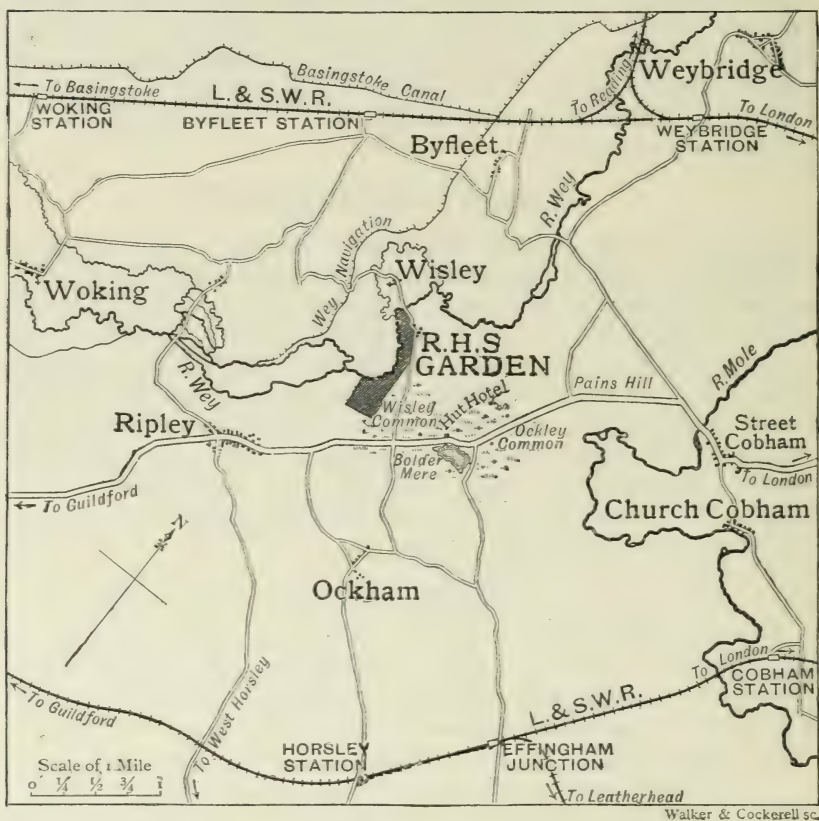
Thus there is plenty for all to do according to their individual liking : personal effort, money, plants, books, are all alike needed. The Secretary, therefore, asks those who read these lines to do their best to help in any of the methods above indicated.

Fellows will be pleased to learn that, since our last issue, a complete photographic outfit for Wisley has been presented by Mrs. Lewis, of Marbury Hall.

11. THE SOCIETY'S GARDENS AT WISLEY.

The Gardens are open daily to Fellows and others showing Fellows' Transferable Tickets from 9 A.M. till sunset, except on Sundays, Good Friday, and Christmas Day. Each Fellow's ticket admits three. The public are not admitted. The Gardens will be closed entirely, by order of the Council, on Friday, July 19.

The Gardens are situated at Wisley, about 2 miles from Ripley in Surrey, and $5\frac{1}{2}$ miles from Weybridge, on the South-Western Railway, with



POSITION OF THE SOCIETY'S GARDENS.

frequent trains from Waterloo and Clapham Junction. Carriages to convey four persons can be obtained by writing to Mr. D. White, fly proprietor, Ripley, Surrey; the charge being, to and from Weybridge, waiting two hours at the Gardens, 8s.; or waiting three hours, 10s.; or to and from Horsley, 7s.; Effingham Junction, 7s.; Byfleet, 7s. Visitors should in all cases be careful to state the trains they intend to arrive by and leave by. Carriages can also be obtained at Weybridge for 8s. by writing to Mr. Trembling, New Road, Weybridge. Excellent accommodation and refreshments can be had at the Hut Hotel, close to the Gardens, and also at the Hautboy at Ockham.

12. THE WISLEY RESEARCH STATION.

The new Research Station and Laboratory at Wisley is nearing completion, and will be opened during the summer. Mr. F. J. Chittenden has been appointed Director of the Research work in matters affecting practical Horticulture, and also Lecturer to the Students. By the completion of this station a long-felt want has been met. In the United States, where so much good work has been done in this direction, all is paid for by Government, but in this country we have to fall back on private individuals or on Societies.

13. STUDENTS AT WISLEY.

The Society admits a limited number of young men, not exceeding 22 years of age, to study Gardening at Wisley, where the scope for effective training has been recently still further developed by the erection of a Laboratory and Research Station. After August next the course of training will include not only practical work in all the main branches of Horticulture, but also lectures, demonstrations, and practical Horticultural Science in the Laboratory, whereby a knowledge of Garden Chemistry, Biology, &c. will be obtained. The Research Station and Laboratory will be equipped with the best apparatus procurable for Students. The training will extend over a minimum period of two years, with a progressive course of study. Students can only enter at the end of September and the end of March, so that a regular systematic curriculum may be followed.

14. DISTRIBUTION OF SURPLUS PLANTS.

In a recent Report the Council drew attention to the way in which the annual distribution of surplus plants has arisen. In a large garden there must always be a great deal of surplus stock which must either be given away or go to the waste heap. A few Fellows, noticing this, asked for plants which would otherwise be discarded; and they valued what was so obtained. Others hearing of it asked for a share, until the Council felt they must either systematise this haphazard distribution or else put a stop to it altogether. To take the latter step seemed undesirable. Why should not such Fellows have them as cared to receive such waste and surplus plants? It was therefore decided to keep all plants till the early spring, and then give all Fellows alike the option of claiming a share of them by ballot.

Fellows are therefore particularly requested to notice that only waste and surplus plants raised from seeds or cuttings are available for distribution. Many of them may be of very little intrinsic value, and it is only to avoid their being absolutely wasted that the distribution was established. The great majority also are of necessity *very small*, and may require careful treatment for a time. Fellows asking for a share in these avowedly waste and small plants, and then complaining that they are worthless or small, are very illogical.

Fellows are particularly requested to note that a Form of Application and list to choose from of the plants available for distribution is sent in January *every year* to every Fellow, enclosed in the "Report of the Council." To avoid all possibility of favour, all application lists are kept until the last day of February, when they are all thrown into a Ballot; and as the lists are drawn out, so is the order of their execution, the plants being despatched as quickly as possible after March 1.

Of some of the varieties enumerated the stock is small, perhaps not more than twenty-five or fifty plants being available. It is therefore obvious that when the Ballot is kind to any Fellow he will receive all the plants exactly as he has selected, but when the Ballot has given him an unfavourable place he may find the stock of the majority of plants he has chosen exhausted. A little consideration would show that all Fellows cannot be first, and some must be last, in the Ballot. Application forms received after March 1 and before April 30 are kept till all those previously received have been dealt with, and are then balloted in a similar way. Fellows having omitted to fill up their application form before April 30 must be content to wait till the next year's distribution. The work of the Gardens cannot be disorganised by the sending-out of plants at any later time in the year. All Fellows can participate in the distribution of the year *following* their election.

The Society does not pay the cost of packing and carriage. The charge for this will be collected by the carriers on delivery of the plants, which will be addressed exactly as given by each Fellow on his application form.

It must, however, be borne in mind that, owing to the lack of facilities at the local Post Office, and the refusal of the P.O. authorities to collect parcels, it is impossible to send plants by post. Rail or carrier are the *only* available methods.

Fellows residing beyond a radius of thirty-five miles from London are permitted to choose double the number of plants to which they are otherwise entitled.

Plants cannot be sent to Fellows residing outside the United Kingdom, owing either to length of time in transit or to vexatious regulations in some foreign countries; but the Council will at any time endeavour to obtain for Fellows living abroad any unusual or rare seeds which they may have been unable to procure in their own country.

15. THE SOCIETY'S HALL AND OFFICES.

The Royal Horticultural Hall and Offices are situated in Vincent Square, which lies straight through Ashley Gardens from Victoria Street, Westminster, and is about five minutes' walk from the Victoria and St. James's Park Stations.

16. LETTING OF THE HALL.

Fellows are earnestly requested to make known among their friends and among other institutions that the ROYAL HORTICULTURAL HALL is available, twelve days in each fortnight, for Meetings, Shows, Exhibitions,

Concerts, Conferences, Lectures, Balls, Banquets, Bazaars, Receptions, and other similar purposes. The Hall has a floor surface of 13,000 square feet. It is cool in summer and warm in winter. For a Concert it will seat 1500, or for a public meeting 2000. It is undoubtedly the lightest Hall in London, and its acoustic properties have been pronounced excellent by some of our greatest authorities. The charges, which are very moderate, include lighting, warming in winter or cooling the air in summer, seating, and the use of trestle-tabling and platform. The first floor, consisting of four fine rooms, may also be hired for similar purposes, either together with or separately from the Great Hall. This accommodation can also be divided up if desired. Ample cloakrooms for ladies and for gentlemen are available. In fact, the Hall is not only the most



POSITION OF THE SOCIETY'S HALL.

suitable Hall in London for special Shows of a high-class character, but it is also second only to the Queen's Hall and the Royal Albert Hall for the purposes of Concerts and Meetings. Reduction is made to Charities, to Societies kindred or allied to Horticulture, and to Societies meeting at regular intervals. The regulations &c. for hiring the Hall are printed in the "Book of Arrangements," and full particulars may be obtained on application to the Secretary R.H.S., Vincent Square, Westminster, S.W., with whom dates may be booked.

17. EXHIBITIONS, MEETINGS, AND LECTURES IN 1907.

A full programme for 1907 will be found at pp. 37 to 57 in the "Book of Arrangements," 1907. It will be noticed that an Exhibition and Meeting is held in the Royal Horticultural Hall practically every fortnight throughout the year, and a short lecture on some interesting

subject connected with Horticulture is delivered during the afternoon. Special Shows have also been arranged on days other than those of the Society's own Exhibitions. See page 32, "Book of Arrangements" 1907.

A reminder of every Show will be sent in the week preceding to any Fellow who will send to the R.H.S. Offices, Vincent Square, S.W., a sufficient number (30) of halfpenny cards *ready addressed* to himself.

18. THE TEMPLE SHOW, 1907.

The twentieth great annual Flower Show in the Inner Temple Gardens, Thames Embankment, will be held, by the kind permission of the Treasurer and Benchers of the Inner Temple, on Tuesday, Wednesday, and Thursday, May 28, 29, and 30. See pages 42-46, "Book of Arrangements," 1907.

19. HOLLAND HOUSE SHOW, 1907.

By the kind permission of the Dowager Countess of Ilchester the Summer Show will be held at Holland House on July 9 and 10, full particulars of which will be found in the "Book of Arrangements," 1907. The rules for the Temple Show apply as far as possible to Holland House, but there is sufficient space to allow of an extra Tent for Horticultural Sundries. See page 48, "Book of Arrangements," 1907.

20. BRITISH-GROWN FRUIT SHOW, 1907.

The Great Autumn Show of British-grown Hardy Fruits, which the Society has held for so many years past, has become as much a thing to be regularly looked for by fruit-growers as the Show at the Temple in May is looked for by growers of flowers.

The fourteenth of these Shows will be held on October 17 and 18, 1907, in the Society's Hall, and, being in the very heart of London, should prove very attractive to the public.

21. COLONIAL-GROWN FRUIT SHOWS, 1907.

The President and Council have decided to hold Shows of Colonial-grown Fruit on June 13 and 14 and November 28 and 29, 1907.

The object of fixing these dates is, if possible, to suit the season which is most likely to find the produce of Australia, Tasmania, and New Zealand, and of Canada, British Columbia, and the West Indies, in the greatest perfection in London. Opportunity is afforded for each Colony to make collective exhibits in addition to the exhibits of individual firms. The Agents General and other officials are most kindly rendering every assistance, and we trust that both growers and shippers will do their best to send in exhibits worthy of our Colonies, and to show what can be produced for the Home markets. No entrance fee or charge for

space is made, and tabling is also provided free of expense. If desired any produce may be consigned direct to the Society, and it will be stored in the cellars at Vincent Square and staged by the Society's officials, but the Society cannot undertake to repack and return any exhibits. Medals and other Prizes are offered by the Council in each class.

Two Colonial Fruit Shows will probably be held in 1908, on or about March 19 and 20 and June 11 and 12, but these will somewhat depend on the response which the Colonies themselves make to the Society's efforts on their behalf in 1907.

Particulars of the Shows can be obtained from the Secretary R.H.S., Vincent Square, Westminster, S.W., by enclosing one penny stamp in order to cover the cost of postage.

22. LECTURES.

The new Lecture Room is fitted with an electric lantern of the most modern construction; electric current, gas, and water are laid on, and every provision has been made for the due illustration and delivery of Lectures.

Any Fellows willing to Lecture, or to communicate Papers on interesting subjects, are requested to communicate with the Secretary.

23. EXAMINATIONS, 1908.

1. The Society will hold an examination on January 13, 1908, specially intended for gardeners employed in Public Parks and Gardens belonging to County Councils, City Corporations, and similar bodies. This examination will be conducted in the Royal Horticultural Society's Hall, Vincent Square, Westminster, S.W. The entries will close on January 1, 1908.

2. The Society's Annual Examination in the Principles and Practice of Horticulture will be held on Wednesday, April 8, 1908. Candidates should send in their names not later than March 1. Full particulars may be obtained by sending a stamped and directed envelope to the Society's offices. Copies of the Questions set from 1893 to 1907 (price 2s.) may also be obtained from the office. The Society is willing to hold an examination wherever a magistrate, clergyman, schoolmaster, or other responsible person accustomed to examinations will consent to supervise one on the Society's behalf.

In connection with this examination a Scholarship of £25 a year for two years is offered by the Worshipful Company of Gardeners to be awarded after the 1908 examination to the Student who shall pass highest, if he is willing to accept the conditions attaching thereto. The main outline of these conditions is that the holder must be of the male sex, and between the ages of 18 and 22 years, and that he should study gardening for one year at least at the Royal Horticultural Society's Gardens at Wisley, conforming to the general rules laid down there for Students. In the second year of the Scholarship he may, if he like, continue his studies at some other place at home or abroad which is

approved by the Council of the Royal Horticultural Society. In case of two or more eligible Students being adjudged equal, the Council reserve to themselves the right to decide which of them shall be presented to the Scholarship.

3. The Society will hold an Examination in Cottage Gardening on Wednesday, April 29, 1908. This examination is intended for, and is confined to, Elementary and Technical School Teachers. It is undertaken in view of the increasing demand in country districts that the Schoolmaster shall be competent to teach the elements of Cottage Gardening, and the absence of any test whatever of such competence. The general conduct of this examination will be on similar lines to that of the more general examination.

Medals and Certificates are awarded and Class Lists published in connection with these examinations, and the Syllabus may be obtained on application to the Secretary R.H.S., Vincent Square.

24. INFORMATION.

Fellows may obtain information and advice free of charge from the Society as to the names of flowers and fruit, on points of practice, insect and fungoid attacks, and other questions by applying to the Secretary R.H.S., Vincent Square, Westminster, S.W. Where at all practicable, it is particularly requested that letters and specimens may be timed to reach Vincent Square by the first post on the mornings of the Fortnightly Meetings, so as to be laid before the Scientific or other Committees at once.

25. INSPECTION OF FELLOWS' GARDENS.

The Inspection of Gardens belonging to Fellows is conducted by a thoroughly competent Inspector from the Society, who reports and advises at the following cost, viz. a fee of £3. 3s. for one day (or £5. 5s. for two consecutive days), together with all out-of-pocket expenses. No inspection may occupy more than two days, save by special arrangement. Fellows wishing for the services of an Inspector are requested to give at least a week's notice and choice of two or three days, and to indicate the most convenient railway station and its distance from their Garden. Gardens can only be inspected at the *written* request of the owner.

26. AFFILIATION OF LOCAL SOCIETIES.

One of the most successful of the many new branches of work undertaken since the reconstruction of the Society in 1887 is the unification of all local Horticultural, Floral, and Gardening Societies by a scheme of affiliation to the R.H.S. Since this was initiated, no fewer than 200 Societies have joined our ranks, and that number is steadily increasing.

Secretaries of Affiliated Societies can now obtain on application a specimen copy of a Card which the Council have prepared for the use of Affiliated Societies wishing to have a suitable Card for Certificates,

Commendations, &c. It can be used for Fruit or Flowers or Vegetables. Price 3s. 6d. for 10 copies, 5s. 6d. for 20, 11s. 6d. for 50, 20s. for 100.

The Council have also struck a special Medal for the use of Affiliated Societies. It is issued at cost price in Bronze, Silver, and Silver-gilt—viz. Bronze, 5s. 6d., with case complete; Silver, 12s. 6d., with case complete; Silver-gilt, 16s. 6d., with case complete. Award Cards having the Medal embossed in relief can be sent with the Medal if ordered—price 6d. each.

27. MONOGRAPH ON FUNGOID PESTS.

The attention of Fellows is directed to a handsome volume lately published by the Society on Fungoid Pests of Cultivated Plants, by Dr. M. C. Cooke, V.M.H. It consists of 280 pages of letterpress, and is illustrated with 24 coloured plates, containing figures of 360 different fungoid attacks, and 23 woodcuts. The work is divided under the headings of Pests of the Flower Garden, of Vegetables, of Fruit, of the Vinery and Stove, of the Ornamental Shrubbery, of Forest trees, and of Field Crops. These are followed by a Chapter on Fungicides, which explains very clearly how to make the different washes and sprays, and also gives the proportions in which the various ingredients should be used.

Each pest is described separately, and means for its prevention or eradication are given, and the whole work is written so as to interest and instruct the cultivator in the simplest and most practical manner. The volume, as published, is half-bound in calf, as it was considered probable that it would form the text-book on the subject for very many years to come; and it thus makes an admirable school prize or gift to a gardener or student of nature. Price 10s. 6d., R.H.S. Office, Vincent Square.

“No one whose plants are subject to fungoid attacks—and whose are not?—should be without this book; for not only can they by its use identify the disease at once, but they are also told both how to treat it and overcome it, and also how to make the different washes and sprays which the different classes of fungoid attacks require.”

28. RULES FOR JUDGING.

The “Rules for Judging, with Suggestions to Schedule Makers and Exhibitors” have been revised and considerably modified from the experience gained during the last few years. The Secretaries of Local Societies are therefore strongly advised to obtain a fresh copy. It will be sent post free on receipt of a postal order for 1s. 6d. addressed to the Secretary, Royal Horticultural Society, Vincent Square, Westminster, S.W.

29. VARIETIES OF FRUITS.

Many people plant Fruit trees without a thought of what Variety they shall plant, and as a result almost certain disappointment ensues,

whilst for an expenditure of 2*d.* they can obtain from the Society a little 16-page pamphlet which contains the latest expert opinion on Apples, Pears, Plums, Cherries, Raspberries, Currants, Gooseberries, and Strawberries, together with Notes on Planting, Pruning, and Manuring, which for clearness of expression and direction it would be impossible to surpass. It has in fact been suggested that no other 16 pages in the English language contain so much and such definite information. At the end of the pamphlet are given the names of some of the quite new varieties of Fruits, which promise well, but have not yet been sufficiently proved to be recommended for general planting.

Copies of this most valuable little pamphlet for distribution may be obtained at the Society's Office, Vincent Square, Westminster. Price, post free: single copy, 2*d.*, or 2*s.*; 5*s.*, 3*s.*; 10*s.*, 4*s.*

30. SPECIAL PRIZES, 1908.

FOR HYACINTHS.

The Royal Dutch Bulb-growers' Society at Haarlem has offered to present—and the Royal Horticultural Society has accepted—the undermentioned prizes for forced Hyacinths, to be competed for at the R.H.S. Show, at Vincent Square, on Tuesday, March 31, 1908. Each bulb must be in a separate pot (size optional), and all must have been forced entirely in Great Britain or Ireland. No exhibit may contain more than two specimens of any one variety, and no exhibitor may exhibit in more than one class.

DIVISION I.

For Amateurs and Gentlemen's Gardeners.

Class 3.	18 Hyacinths.	First prize	£8 8 <i>s.</i>	Second	£4 4 <i>s.</i>
„ 4.	12 „	„	£6 6 <i>s.</i>	„	£3 3 <i>s.</i>
„ 5.	6 „	„	£4 4 <i>s.</i>	„	£2 2 <i>s.</i>

DIVISION II.

For Nurserymen.

Class 6.	24 Hyacinths.	First prize	£8 8 <i>s.</i>	Second	£4 4 <i>s.</i>
„ 7.	18 „	„	£6 6 <i>s.</i>	„	£3 3 <i>s.</i>
„ 8.	12 „	„	£4 4 <i>s.</i>	„	£2 2 <i>s.</i>

31. ADVERTISEMENTS.

Fellows are reminded that the more they can place their orders with those who advertise in the Society's Publications the more likely others are to advertise also, and in this way the Society may be indirectly benefited.

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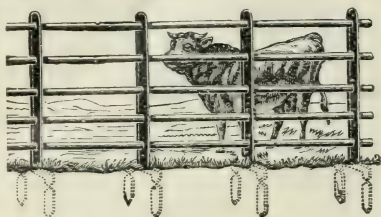
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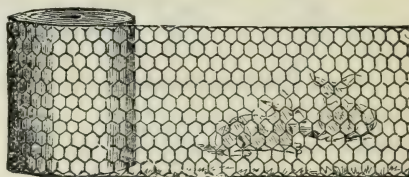
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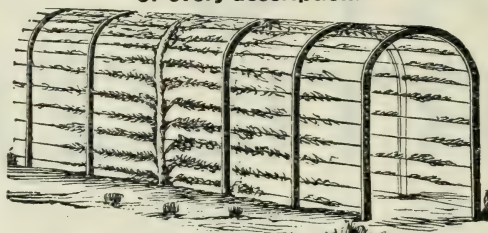


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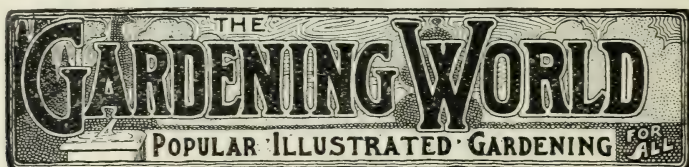
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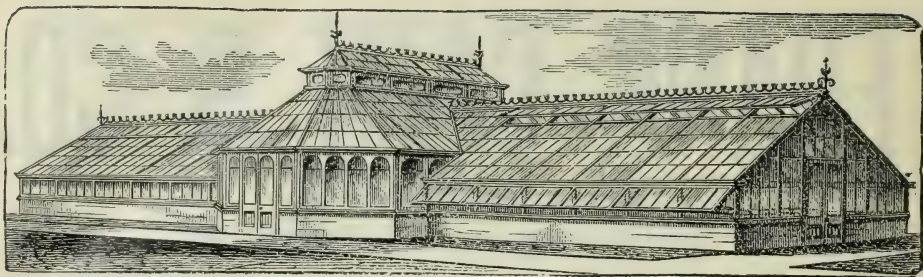
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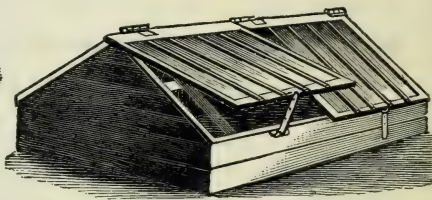
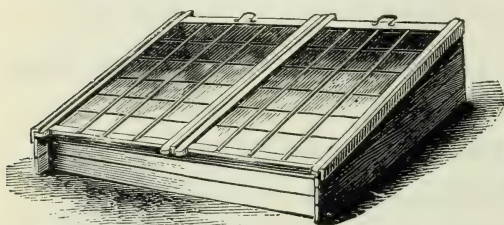
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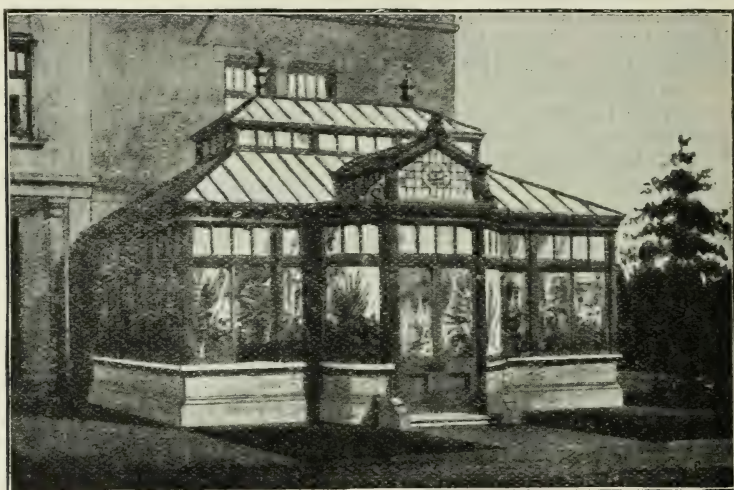
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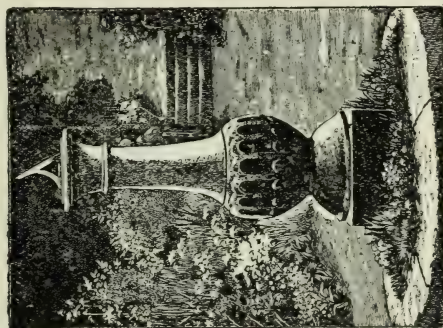
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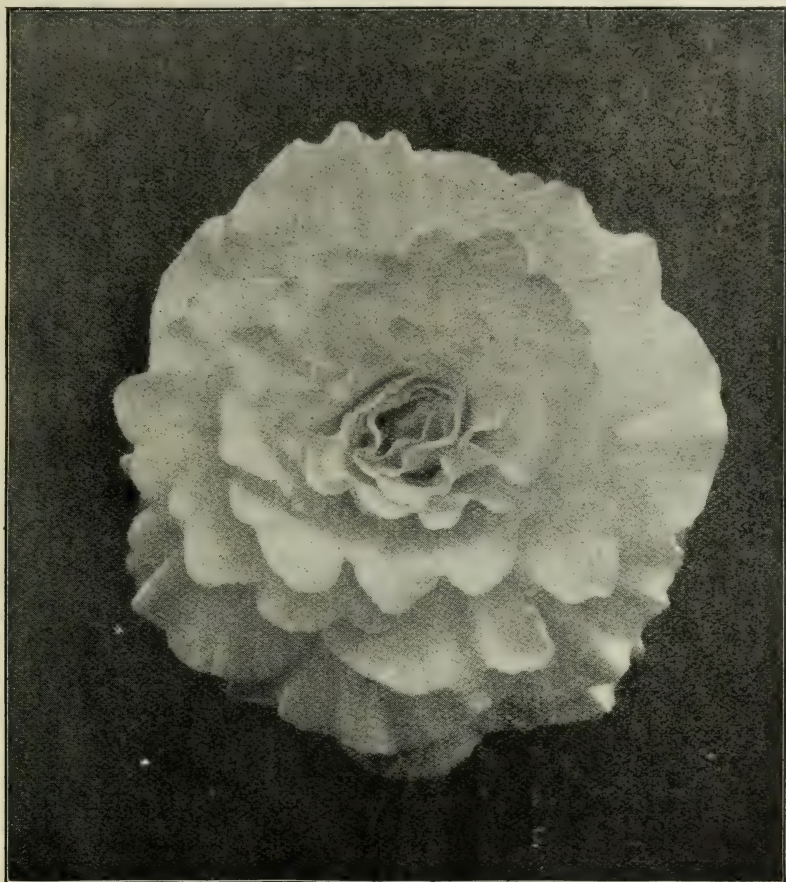
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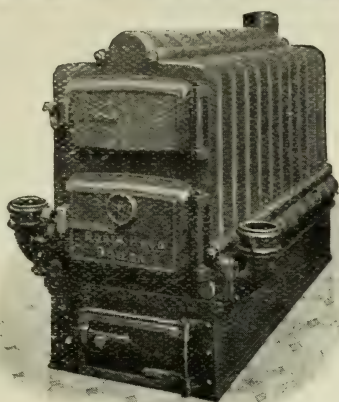
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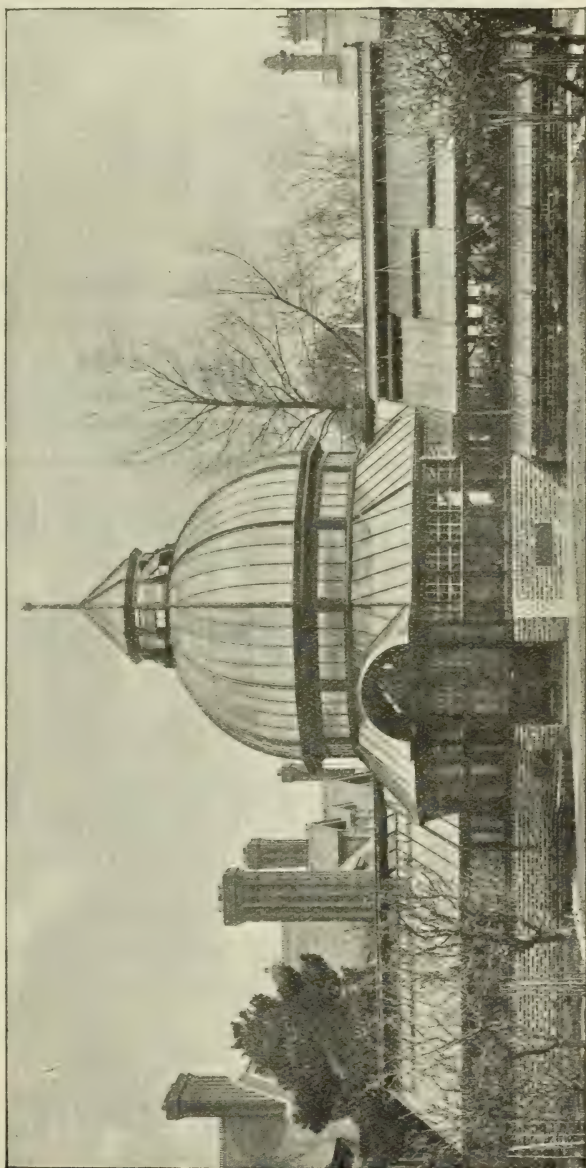
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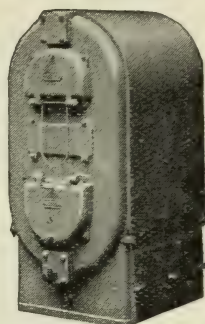
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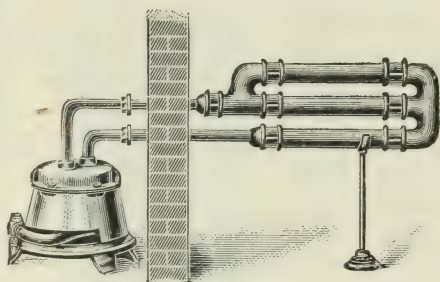
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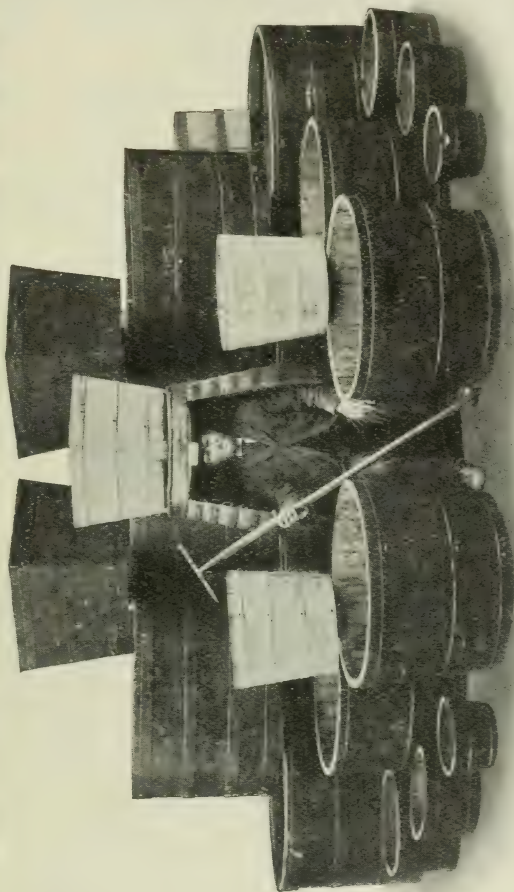
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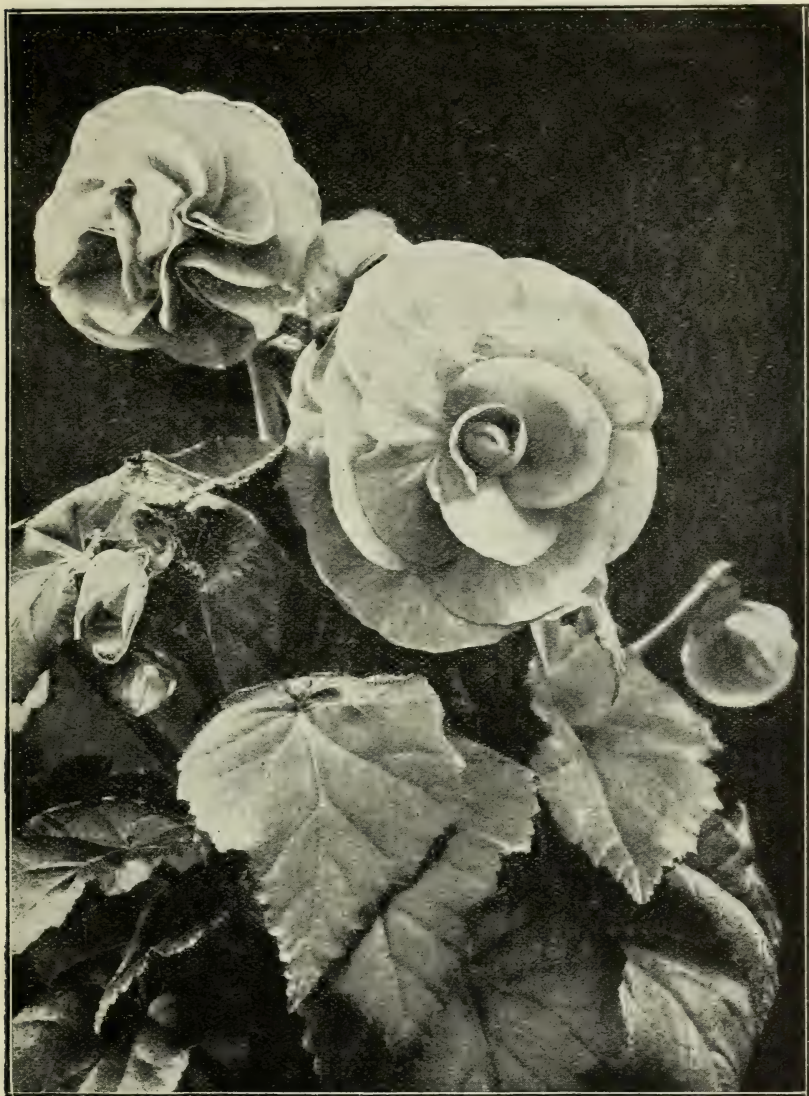
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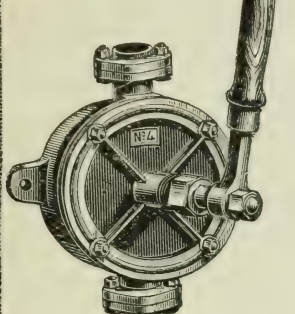


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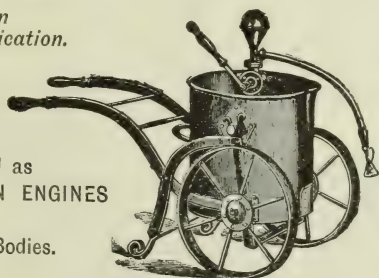
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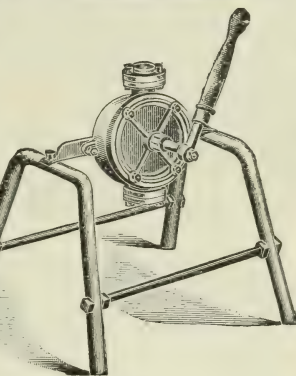
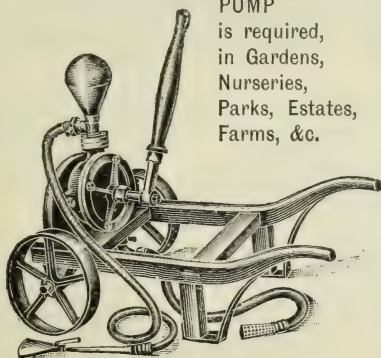


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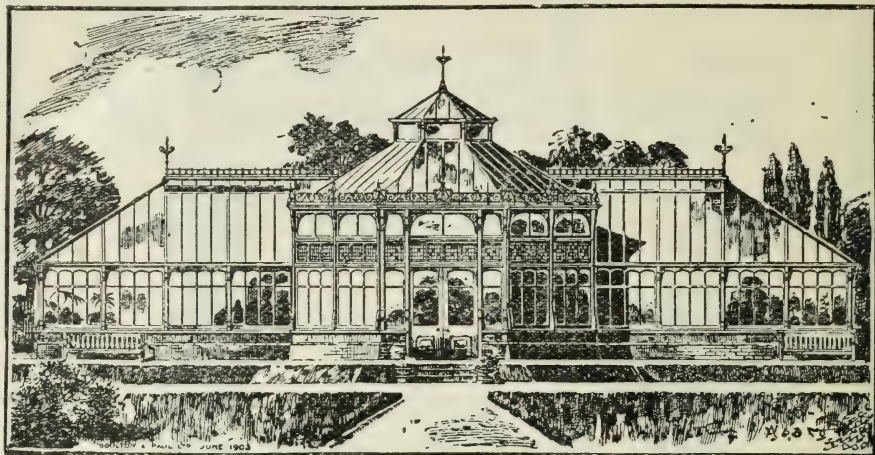
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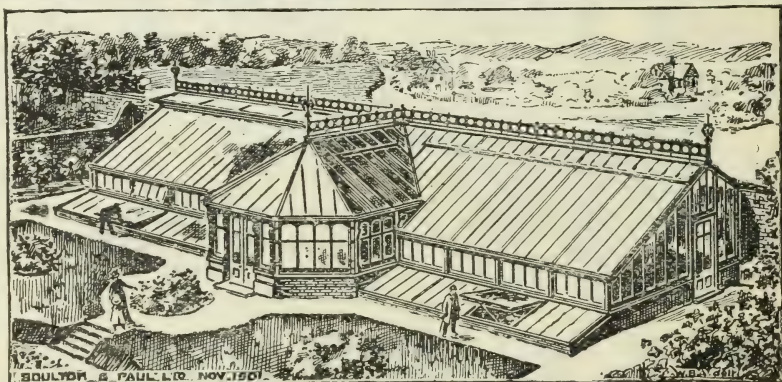
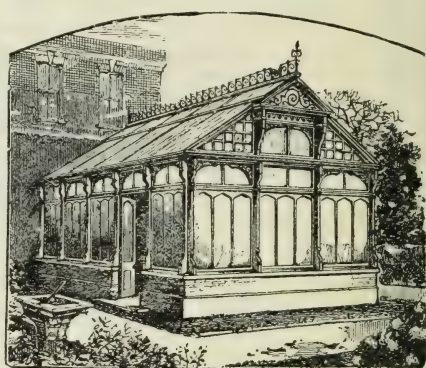
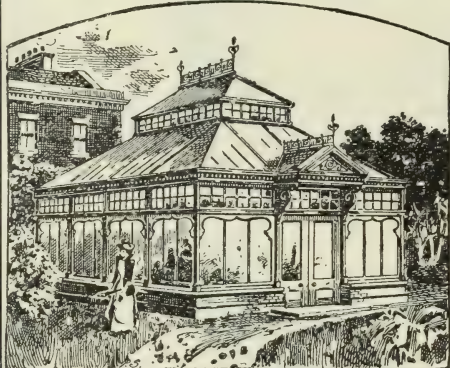
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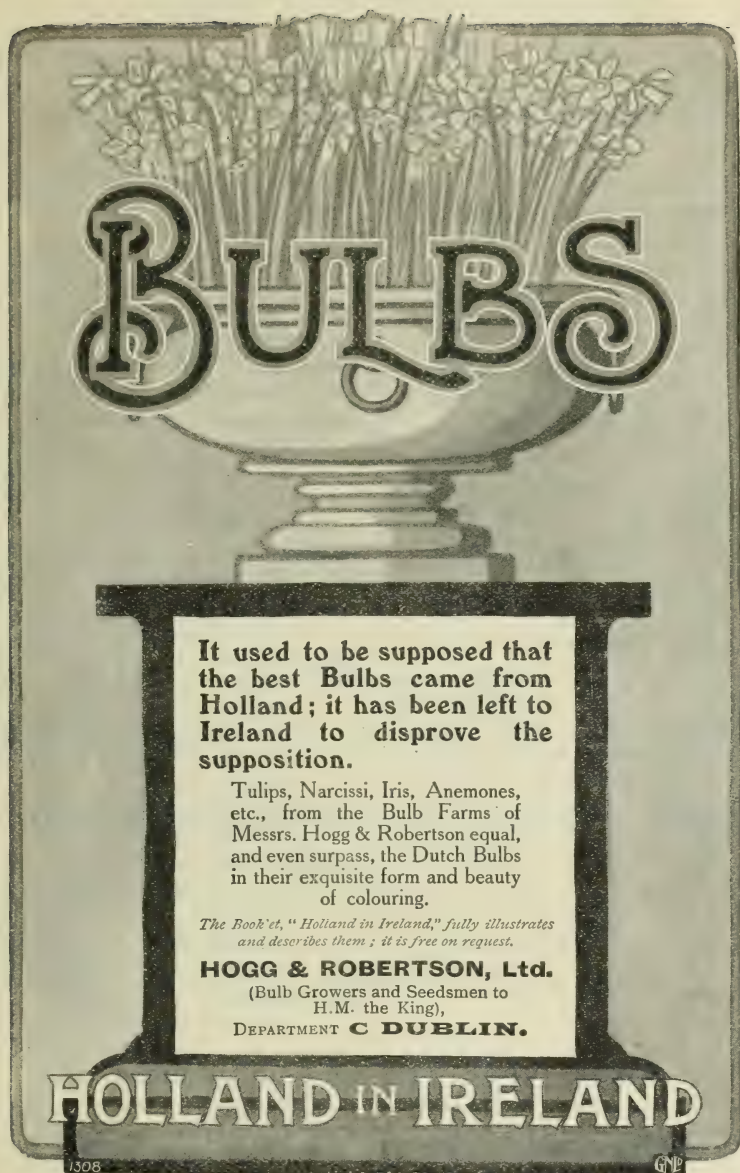
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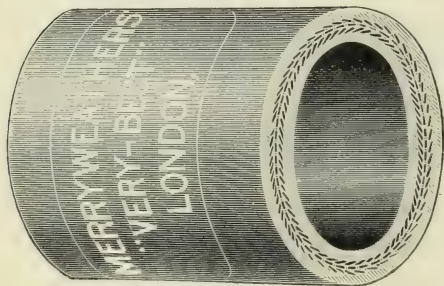


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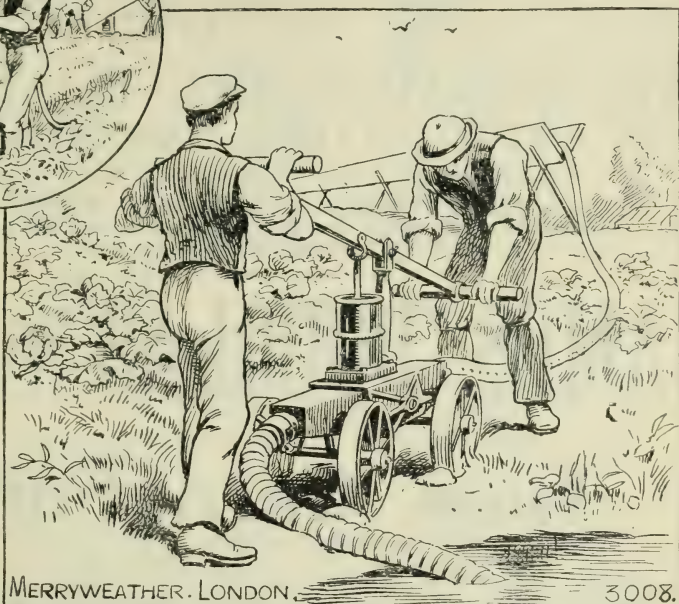
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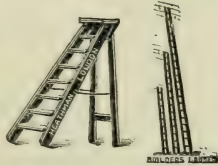
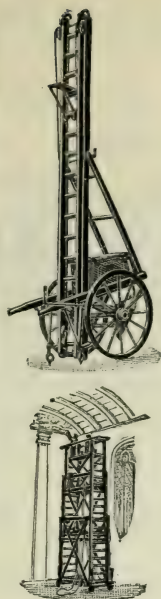
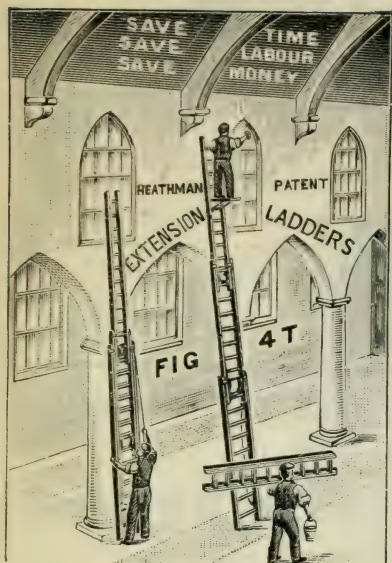
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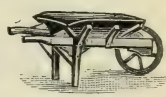
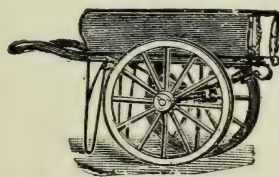
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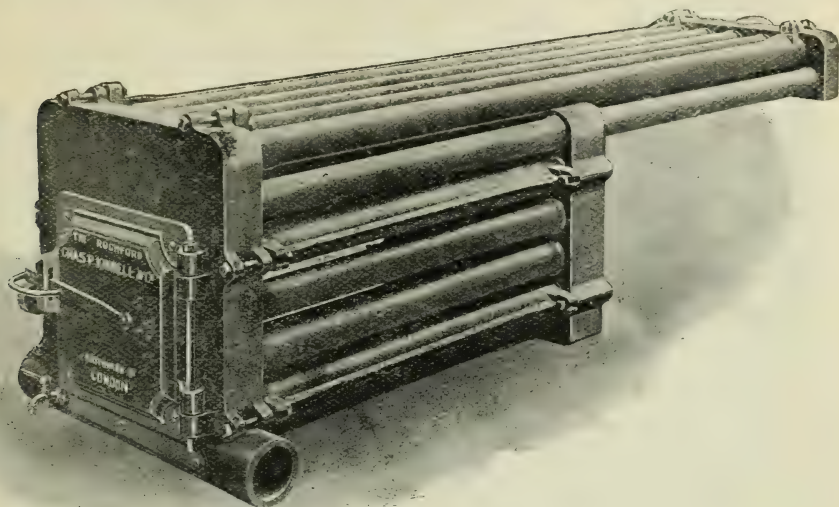
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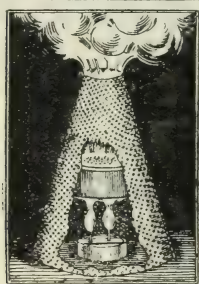
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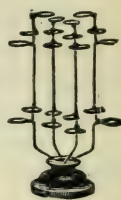
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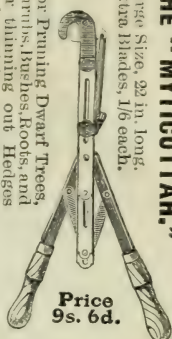
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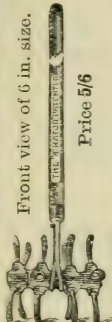
The "Ærator" loosens the soil, admits air, prepares for the coming rain, rouses up the bacteria or insect world, stimulates root action, hastens the growth of the young plants, at the same time destroys the weeds in their infancy, which otherwise in time rob plant life.

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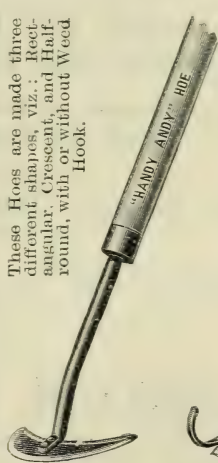


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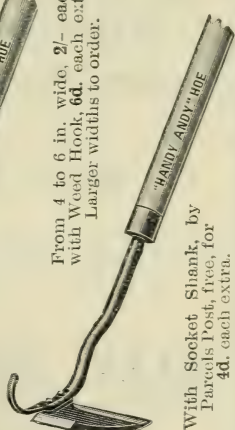
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To centre in this place."



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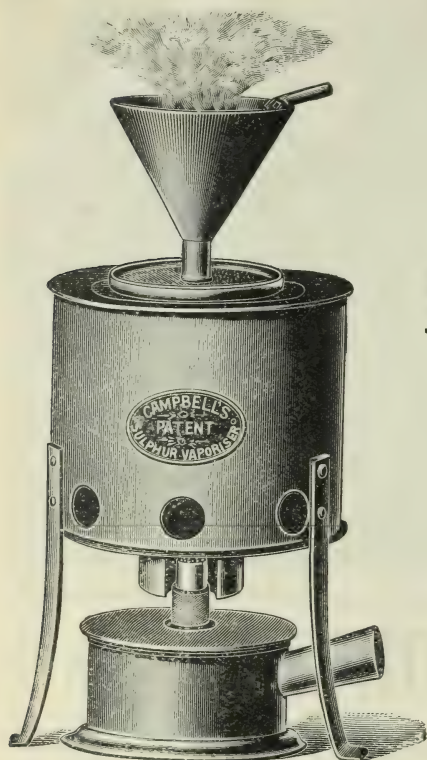
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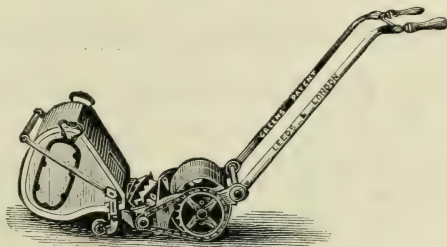
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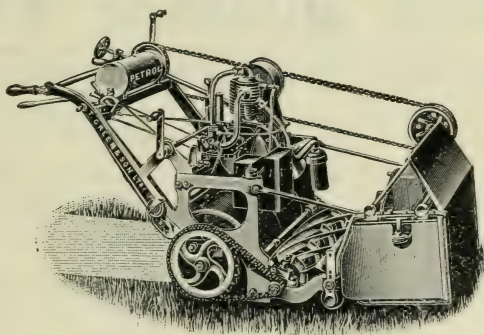
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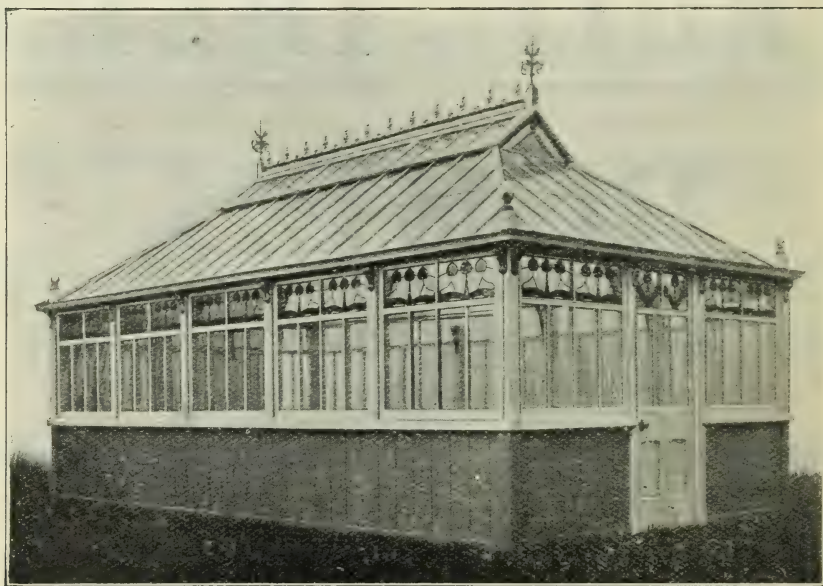
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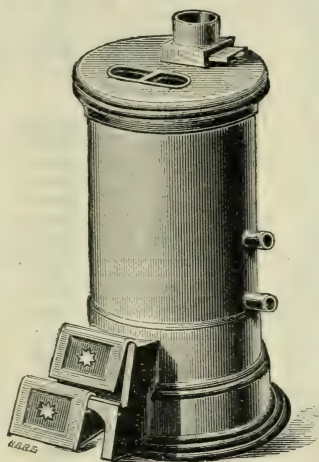
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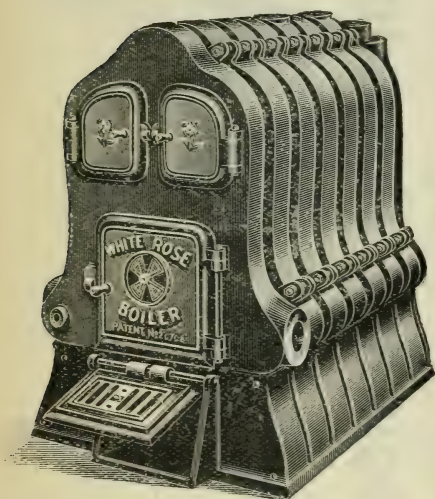
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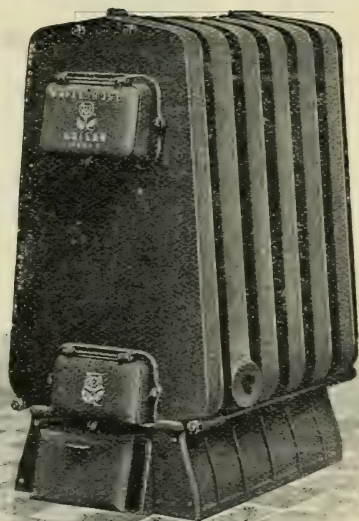


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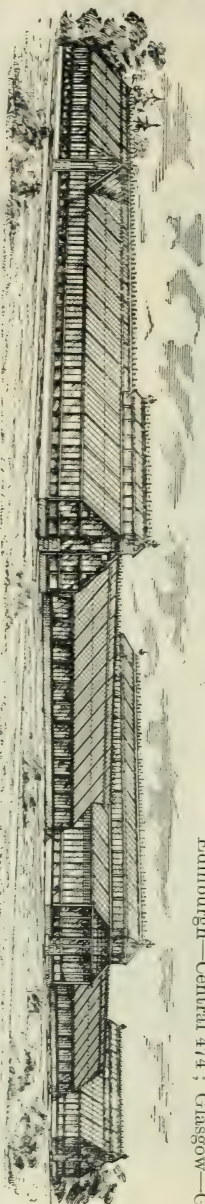
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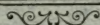
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\* See article in *The Times*, Sept. 15, 1906, and refer to *Kelway's Manual of Horticulture* (380 pp., 1/6 post free from Kelway & Son, refunded to customers).



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